Modern Machine Shop

(ENNAMETAL SALES Doubled IN OCTOBER 1940

he widespread reputation of KEN-NAMETAL as the best carbide for machining steel—together with the arge price reductions effected last extember—has created an unprecedented demand for this superior tool material. As a result, more than twice a many KENNAMETAL tools and blanks were sold in October than in any previous month.



Style No. 11 Tool with Chip Breaker.



Drice List

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MCKENNA METALS Co.

LATROBE, PENNSYLVANIA, U.S.A.





OR over twenty years "LOGAN" has made air and hydraulic operated holding devices for all sizes and types of shells or similar forgings -but to the best of our knowledge this is the first time drawings and data of this type have been assembled and made available for general use. "LOGAN" Collet Chucks and "LOGAN" Expanding Mandrels il. lustrated in this new bulletin have been tested in actual daily service with excellent results. You can't afford to turn down the advantages of 'LOGAN'S' experience on Shell Holding Equipment Write today for the new "LOGAN" Air and Hydraulic Operated Shell Holding Bulletin.

LOGANSPORT MACHINE, INCORPORATED

BULLETIN

901 Payson Road,
Manufacturers of Air and Hydraulic Devices. Chucks, Cylinders, Valves, Presses and Accessories

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HOWARD CAMPBELL, Editor

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NOVEMBER, 1940

Number 6

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Circulation This Issue More Than 32,000



MODERN MACHINE SHOP

November,

Machine Shop

CINCINNATI, OHIO

NOVEMBER, 1940

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Vol. 13, No. 6

In This Issue

The feature article, this month, takes the reader on a "paper" trip through the tew production lines of a modern Diesel engine manufacturing plant. Here is an incellent example of modern production planning—conveyor lines moving the parts solved to, but through, the machines; machines especially designed and built to obtain the maximum of production with a minimum of lost motion on the part of either the operator or the machine; automatic chip exhaust systems which carry off the metal chips and shavings as fast as they are made; controls within easy reach at the operators, and so on.

The layout of the heavy machine departments presented on pages 68 and 69 hows the exact location of each machine and the conveyor lines—and this plan was made before a machine was moved into the shop. It gives the plant manager, in effect, a bird's-eye view of his plant from which he can tell at a glance what pace is available for additional equipment. To provide a perfect picture of the operations, it only remains now for someone to invent a signal system which will how, by means of lights, the movement of parts through the departments.

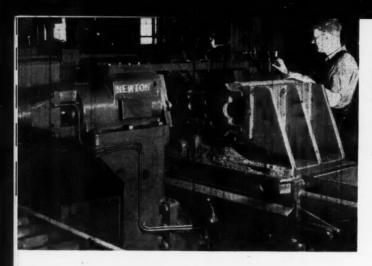
We are very fortunate in being able to give you, this month, a paper by John W. Harper of the General Electric Company in which he explains the development of electrical equipment for machine tool operation and describes the various kinds and types of controls by which the equipment is operated. It is obvious from Mr. Harper's paper that, as the electrical mechanism connected with the operation of the machine has become more complex, the design of the controls has been simblified.

G.G. Landis, who is Chief Engineer of one of our largest manufacturers of weldequipment, gives us some excellent data on the control of expansion and conaction in welding, and the Chief Engineer of another well-known firm provides
excellent information on the general-purpose use of carbide tools.

We hope you like 'em.

R II

MASS



Both ends of the un case are rough milled the case feeds through Newton Duplex Hyan Miller and Broaching k chine, and on the mu stroke of the table in ends of the case a broached to a straight smooth finish

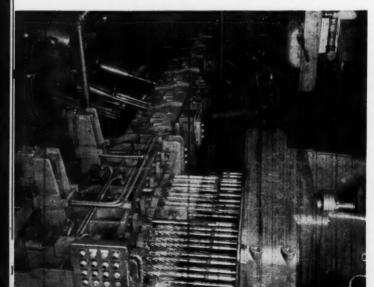
New Production Line for I.H.C. Diesel Engines

Plant Layout at Milwaukee Works Excellent Example of Modern Planning

THE new Diesel engine production line recently placed in operation at the Milwaukee Works of the In-

ternational Harvester Company is a unusual interest by reason of two a partures from ordinary manufacture

ing practice. The first is a market change in the method of grouping the machines, combined with an important increase in the use of automatic



This Greenles Speal
Horizontal Drilling Mchine is one of a battory
of three in which all the
holes in the top, bottom,
sides, and ends of the
crankcase are drilled in
one operation.

Part of the chips tion. By are extra and carri

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The se of Grezontal In this shaft seats a all hol the

Part of the chip exhaust system which removes the chips after the first Greenlee drilling operation. By means of this system all drilling chips at extracted from the crankcase by vacuum and carried to a receptacle outside the building.

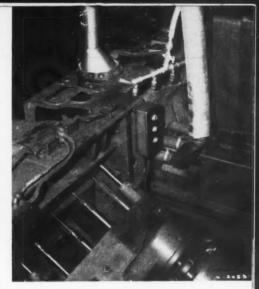
equipment for handling the work. The second is the unusual flexibility of the line in equipment and layout; flexhility which makes it possible to process three different types or sizes of engines in the same line with only minor changes in equipment. The changes consist, for the most part, in changing the heads on some of the machines.

The line is laid out for the processing of two sizes of Diesel engines and a gasoline adaptation of one of the Diesels, all of these models being used both in the tractors made by this company and in stationary power units. The new engine production line was planned and installed under the supervision of J. E. Harris, superintendent of the Milwaukee Works, and V. A. Guebard, assistant superintend-

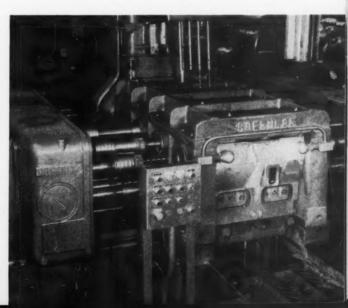
The production line is located in a sawtooth building which is well ven-

tilated and equipped with fluorescent lighting designed to develop an average of 25 footcandles throughout the building, or practically the equivalent of normal daylight.

The new production line includes machinery and equipment for the machining of crankcases, crankshafts, cylinder heads, and connecting rods. As shown in the drawing Fig. 1, the line includes machines which, while not necessary to the complete production of a given model, provide for increased production of a single model or the processing of different models. These machines are shown on the lay-



The second of the battery of Greenlee Special Horicontal Drilling Machines. Is this machine the camshaft and main bearing seats are rough bored and all holes in both ends of the case are drilled.



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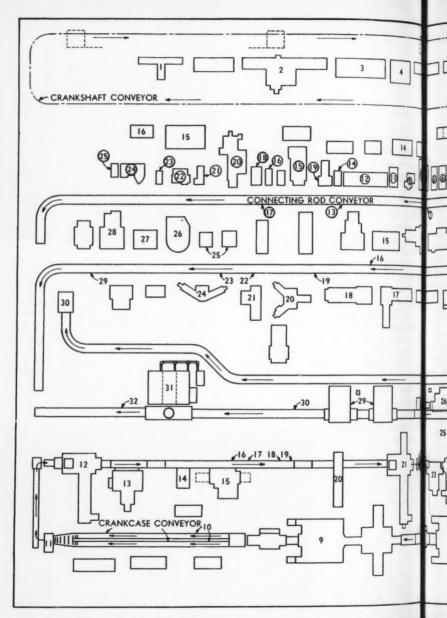
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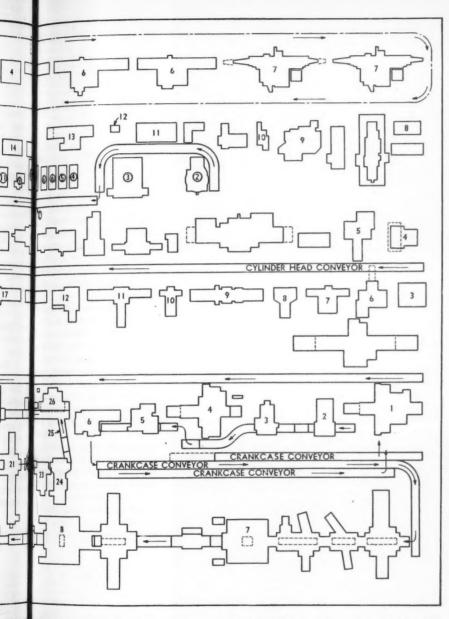
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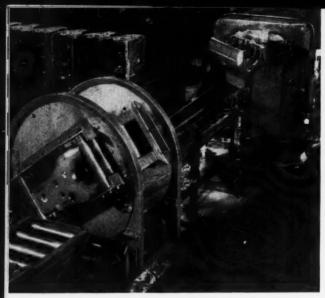
illing N a batter p, botton drilled it tion.



Layout of Production Lines at Milwaukee Works of International Harvester Company for Mails for To Crankcase Line Begins at the Near Right Hand Corner of the Plant, With the Cylinder Next, Conveyors and Overhead Trolleys are Used to Transport Parts.



for Math for Two New IHC Diesel Engines and a Gasoline Adaptation of One of the Diesels. The Cylinder Next, then the Connecting Rod Line, and Finally the Crankshaft Line. Both Roller



Here a crankcase is shown coning out of the washing machine after the tapping operation in been completed on both ends the case. An elevator raise the case to the proper height, then pusher pushes the case onto gravity conveyor where it roll into a "rollover" device which makes a half turn so as to bring the case into position for the third unit of the line.

out, but are not numbered.

As the crankcases are unloaded at the beginning of the production line they are placed on the roller convevor upon which they are to travel from one machine to the next until they are completely machined. At the beginning of the line are three conveyor sections: two to serve as storage and convey the cases into the machine for the first operation, and the third to move cases from the sixth operation to the seventh, as indicated

on the layout. No man broach ual lifting, clamping, or clamping trucking is necessary at simplificany point throughout dampi the line, and at no time is eration it necessary for a crank Fitchbu

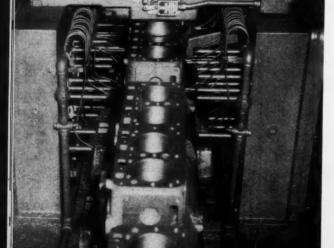
case to be removed from the con-design, veyor. All inspection work is also miled, done on the conveyor.

In the first operation on the crank pads as case, which is performed in a New The ton heavy-duty combination milling three s and broaching machine, the top and and taj bottom are rough machined by strad is equi dle-milling and then are finish mand a chined by broaching—all in one man mechanic chine and one operation. In the secondary

ond operation the locating holes and various other holes are drilled, for which a Natco multiple spindle drilling machine is used, and in the third operation the cylinder steer lored, bores are rough bored oil pa and counterbored.

> operation, the cases pass to another Newton com-

After the first boring and ca



Rear view of third Greener Special Horizontal Tapping Ma-chine in which both sides of the crankcase are tapped.

roach shich ease al

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drilled.

rankcase der sle

ur-spine erformir tration. T allel shown con-Coscup view of three-way
Geneties Drilling and Boring
Michine finish boring the main
al connecting rod bearings,
ruming the oil pump bore, and
faith reaming dowel holes in
both ends of the crankcase. both ends of or raises the eight, then a here it rolls levice which as to bring

ion for the ne line.

No man-

ination milling and maching machine, in which both ends of the ase are milled and finishroached. Torque motor nping or clamping on the fixture essary at simplifies the matter of

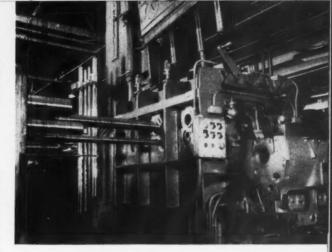
hroughout damping. In the fifth and sixth opno time is erations, which are performed on two a crank Mitchburg milling machines of special the con tesign, the center bearing is straddle is also milled, the bearing liner notches are milled, and the wick groove and side he crank pads are milled.

na New The case now passes to a group of n milling three special semi-automatic drilling top and and tapping machines, each of which by strates equipped with hydraulic clamping nish madand automatic hydraulic one made mechanism, and all operated from one the see master push button control board.
coles and The first two are 15-station machines
illed, for and the third has nine

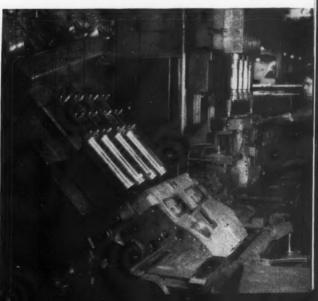
multiple stations. achine is Here the cylinder stud third op holes are drilled, counterer sleeve lored, and tapped, the bored oil pan capscrews are filled, the crankshaft boring and camshaft holes are

rough bored, the valve tapped holes are drilled and semi-finish reamed, and various other holes are drilled and tapped. Between the seventh and eighth operations, as indicated on the layout, the case is cleaned in a special Alvey-Ferguson washing machine and is then turned upside down in an automatic rollover fixture so that the holes in the bottom can be drilled and tapped.

In the ninth operation all holes in the sides are drilled and tapped and the oil holes to the main bearings are drilled. The case is then washed

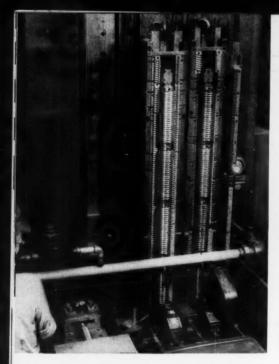


Here a four-spindle boring ma-thine is semi-finish boring the rankcase for the dry liner cyl-ader sleeve and an Ex-Cell-O ar-spindle boring machine is performing the finish boring op-ration. The cylinder sleeve bores m held to 0.0002 inch for parallel and out-of-round.



Greenlet ping Na-les of the ped.

ses pass n com-



Oilgear 40-Ton Double Slide Vertical Breading Machine used for straddle broaching is sides of the connecting rods at both ends straddle broaching connecting rod caps on a slide while broaching the back face and is the side while broaching the back face and the side while broaching the back face and the side while broaching the side was and caps of the rod and caps round diameter of the rod and cap on 6
other slide. All clamping is automatic.

again, after which it is reversed in a rollover fixture for the following operations.

All of these operations are controlled by a series of electric controls and limit switches. Various locking devices eliminate the possibility of confusion or mistiming. Interspersed between these three machines are automatic turnaround and chip unloading devices which require no atten-

The three auomatic washing machines are timed in conjunction with the three automatic transfer

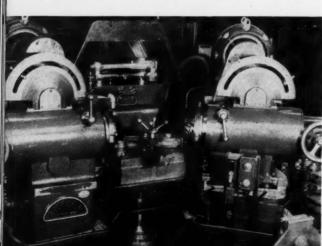
machines.

At various stations on these threshich a machines automatic suction devices are located to remove the chips from the crankcase and convey them to the crankcase and convey them to the convey them to the process of the machines are prolongs the life of the machines are cutters, eliminates untidiness, and the machines are cutters, eliminates untidiness, and the machines are makes some savings in costs.

cutters, eliminates untidiness, a makes some savings in costs.

Camshaft and crankshaft holes a special pump holes are bored simultareously on a roughing and finishing machine which permits their relationships to each other to be main tained accurately for precision results. Cylinder bores are finish-born on an angular-type Ex-Cell-0 precision boring machine on which ead spindle is individually driven by led crive. After finish boring, the piston and the spindle is a Barnes single holes are honed in a Barnes single holes are bored in a

spindle vertical home speci-machine to produce the machine close accuracy and mit which ror-finish which is con sidered necessary for maximum engine per



Both ends of the connectar rod are balanced in this sy der balancing machine. It total variation in weight of four connecting rods in the Diesel motor is held to with two-tenths of an ounce.

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tatic and ce in a cranks ing r rtical Breat Dilling, reaming, and proaching the apping both ends of a south ends of a rankshaft in a Snyder I caps on the caps of the caps on the caps of the caps on the caps of the cap apping Machine.

Is machine all the opcap on 6 automatic. and unload the chine and push the oper button on the control panel.

onjunction transfe mmance.

C Washin

Cylinder heads.

Cylinder heads, hese threshich are of alloy on device on with a high chrome content, are ships from mealed in a Hagan gas-fired, pusherthem to the performance and then sandblasted building efore being delivered to the marom chine shop for machining. In the first machining operation (indicated as seess, as to 3 on the layout), the tops and ottoms are rough and finish-milled holes are special Ingersoll drum-type milling machine. Following this, the holes finishing rediiled in a Barnes multi-spindle ertical boring machine, the various be main the second of th

n by bed An interesting the pistor machine in the cylses single more head line is a hourst special Oilgear duce the machine machine and mile which presses in

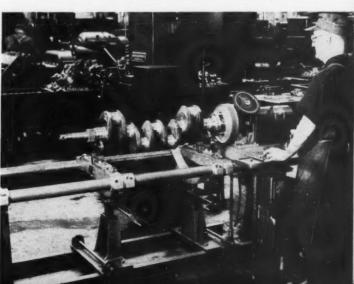
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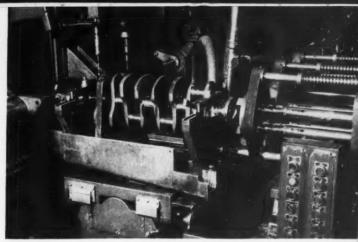
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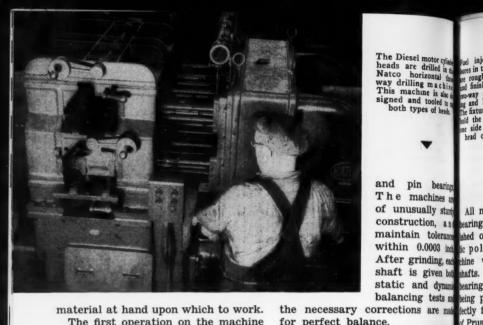
all valve guides simultaneously and then broaches and burnishes the inside of the valve guide stem. The broaches fall through into a container beneath the machine. Each spindle of the machine is equipped with an electric eye which flashes a warning to the operator if the pressures are either too high or too low.

On the crankshaft line the shafts are carried in cradles on a 500-ft. endless overhead conveyor which makes a complete circuit of the machines on the line. Each cradle carries six shafts and the cradles are close enough together so that any one of the workmen will always have



this by lesting a Diesel motor intended in the both weight that and dynamic balis in the nec in a modern type to with a crankshaft balancing machine.





The Diesel motor cyline heads are drilled in a Natco horizontal than way drilling maching This machine is also is signed and tooled in a both types of heads.

res in 1

e side head (

material at hand upon which to work. The first operation on the machine line is that of straightening the shaft, which is done in a Hannifin straightening press equipped with a special fixture and also with a flexible shaft grinder which is used to remove all sharp edges from the rough piece. The latest type of Norton grinding equipment is used in grinding the line

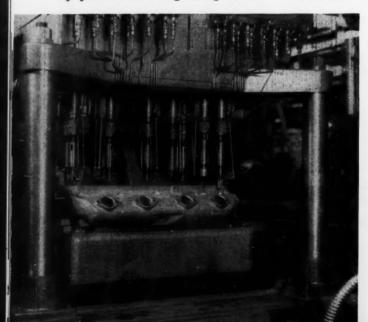
and pin bearing The machines in

for perfect balance. of Prus

for perfect balance.

A unique machine in the crait baring shaft line is an automatic Snyle through drilling machine which drills, conterbores, reams, and taps flange her at the flange end of the shaft which cally-opposed holes in the student tact from the struction with all eral automatic in dex from front in the cylinear, with automatic rear, with automatic rear, with automatic return to starting position when a the described open.

the described open tions have been completed.



After drilling, the cris der head is taype Natco three-way tappe This machine machine. This machi also designed and tool to tap both types of heads.

Ex-Cell-(oring, chine, e Three d pump the

ful injection nozzle bert in the cylinder head ar rough, semi-finished, and finish bored in this noway horizontal drill-ing and boring machine. The fixture is designed to motor cylinic drilled in the zontal thro machine ne is also to tooled to m s of heads. old the TD-6 head on side and the TD-9 head on the other.

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connes as a control of the control o he crant bearing must show a trace of blue ic Snyds throughout its entire length.

ills, com The first operation on connecting ange his rds is broaching the two sides of the naft while crankpin end, two sides of the wristdiametr pin end, the half-hole, the caps, constudent lact face, and two mortise joints ition on which hold the cap and rod together rith all and one side of the rod which is ma-natic is chined so that it may clear through front to the cylinder bores.

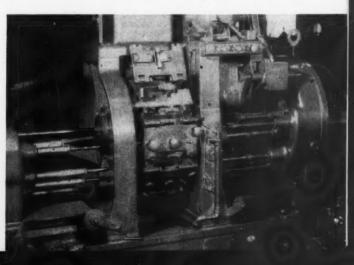
automatic The machine used for this work startings a vertical, twin-ram, 40-ton Oilhen a gear surface broaching machine with ed open

two fixtures which operate in-andout in sequence with two rams. All pieces are automatically clamped.

Both sides of the crankshaft end of the rod are ground in a Blanchard surface grinder, then the crankshaft bearing hole is reamed in a Baker single spindle drill press and finished to size by grinding in a Heald Sizematic internal grinder. This last operation eliminates the possibility of a bell-mouthed bore. The wristpin hole is diamond bored in a Ex-Cell-O diamond boring machine.

Balancing pads are provided at both the wristpin and crankpin ends of the rod, and the rod is balanced to within two-tenths of an ounceinch on a rise-and-fall Snyder automatic balancing machine. The con-

Ex-Cell-O drum-type twomy drilling, tapping, loring, and turning matapping, ped in th chine, especially designto machine oil pump dies for Diesel motors. Three different sizes of types of pump bodies are machined in one operation.



necting rods are thus held within balance from the beginning of production, which is an important factor in reducing future service problems.

All pistons are turned on automatic lathes, and the wristpin hole is bored in an Ex-Cell-O precision boring machine. All pistons are handled on conveyors which are built with return conveyors underneath for empty piston trays. No grinding is done on the outer surface of the piston, the periphery being finished by diamond turning in a special Sundstrand automatic lathe. The finish and smoothness are said to be at least equal to the usual ground finishes.

Cylinder sleeves are bored in a vertical eight-spindle W. F. & John Barnes boring machine and the outer diameters are turned in Fay automatic lathes. They are then delivered to a gas furnace built into the production line where they are heat

treated to within a range of 45-55 Rockwell C.

Special short gravity-feed convey.
ors between the groups of operations make trucking or handling from one operation to the next unnecessary.
The sleeves roll from one machine to the next on the inclined conveyors.

Among the miscellaneous parts manufactured in this plant are the oil pumps and covers, water pumps drive pulleys, starting crank nuts and other machine parts as well as repair parts. An interesting machine in use in the machining of oil pump bodies is an Ex-Cell-O trunnion horizontal multiple drilling and reaming machine which performs every operation required on an oil pump body except the centering and turning operations. No line boring or reaming is necessary after the pump body leaves this machine. It is fully automatic and is governed by push buttons.

The Lincoln Weldirectory. Procedures for producing all types of welds in mild steel, for welding all metals used to any extent industrially, and for applying surfacing metal to meet any type of wear-action in service are given in this 58-page, profusely illustrated bulletin published by The Lincoln Electric Co., Cleveland, Ohio.

The bulletin gives complete procedures for flat, vertical, or overhead welding of mild steel; single or multiple pass welding and poor fit-up in mild steel; flat welding of fillet welds in mild steel; flat welding of deep-groove joints in mild steel; flat welding of deep-groove joints in high tensile steels; general welding of high tensile steels; welding light gauge steel, 18-8, 25-12, 18-8 SMO and 25-20 stainless steels, 4-6 chrome steels, chromium molybdenum, nickel chrome alloys, high manganese steel, cast iron, aluminum, bronze, brass, and copper; surfacing to produce moderate shock and abrasion-resisting welds; rolling or sliding abrasion - resisting welds; and making tool steel cutting edges on ordinary steel and rebuilding worn tools and dies.

The procedures, which cover all types of welding, include recommended cur-

rent ranges and arc voltages; suggestions regarding arc length, polarity of welding current, distance to hold electrode from work, cleaning beads, welling up or down, use of wide and morow beads, peeing to increase harness, quenching, weaving the electrode and so on. Properties of welds produced in various metals are given and typical welding applications are illustrated.

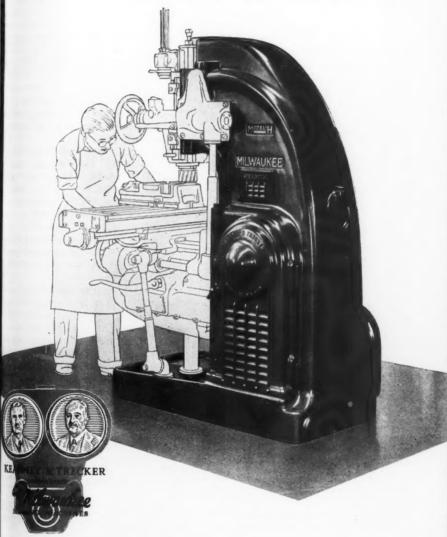
A valuable feature of The Lincoln Weldirectory is a chart serving as a guide for selection of electrodes in various applications, in addition to a discussion of flat, convex, and excave beads. Another feature is a two page illustrated section giving information and pointers on the proper use of modern shielded arc welding. A is page section covers the subject of surfacing with arc welding and includes a chart for selection of electrodes for particular applications, together with the tailed procedures for this important branch of welding. Arc welding accessories are illustrated and described a eight pages of the bulletin.

Copy of The Lincoln Weldirectory will be sent free of charge to anyone requesting it on his company letterhead

In vertical Milling Machines also, rigidity originates in the celumn — the backbone of the machine — and determines the productive capacity of the machine more than any one other factor.

Note how carefully the column of a Milwaukee Vertical Milling Machine has been engineered for the proper distribution of metal—an inside horizontal wall divides it into a double box section, the cross mounting of the motor permits a solid rear wall, which, together with the solid front face, assures an unusually rigid structure.

KEARNEY & TRECKER CORPORATION . Milwaukee, Wis. U. S. A.



MILWAUKEE MILLING MACHINES

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ber, 1940

Progress in Controls for Machine Tools~

* By JOHN W. HARPER Industrial Dept. General Electric Company g cen

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FLECTRICAL controls, particularly for machine tools, have undergone tremendous changes in the past twenty to twenty-five years. Twentyfive years ago textbooks on electricity touched only very lightly on the control question, and referred principally to railway controls. Practically nothing was said about controls for industrial uses. As a matter of fact, electrical controls available were far different in appearance and function from any now in use.

Then, a great many machines had manual starters, often open, with no protection against accidental contact with live parts. Magnetic control, when used on machines, was of the simplest type; as a rule consisting only of something to start and stop the motor and protect it against voltage failure and overloads. There were a few applications, such as on planers and some milling machines, where something other than simple starters were used.

Machines often had only one or two motors, most functions being obtained mechanically. Planers and milling machines again serve as examples where a somewhat more elaborate control had been worked out. There were some electric feed applications in which the main drive and feed had separate motors that had to be interlocked. In the case of the planer, the feed would operate only at the end of the stroke, although for traverse purposes, the same motor could be used eads t at other times, properly protected of hafts, course, against getting the wrong reakir combination.

Milling machine feeds had to be so introls arranged that the spindle motor ary to would be running before the feed less we could be started, and also so that it ted, or would stop last. These examples are utters elementary, and are still with us, but baded, they illustrate one reason for the etic drift away from manual controllers to magnetic. Such interlocking would lt sl have been out of the question with ssume manual devices.

Another reason for this change was \$ no fi the greater ease and flexibility of al co tainable with magnetic devices. This he could be ties in with the previous examples mall but it also involves the question of the de physical exertion required to operate ot t large manual controllers and the ne many s cessity of the operator's going to the device to operate it, as in many instances the controller could not be located conveniently to operating position.

With magnetic control, even of the simplest kind, all the operator had be worry about was a small push but larg M ton station, which, if the character t, Rai

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otor,
ad Pur
tox. 11
a. Wid

^{*}Presented before the Machinability Grown Cincinnati Chapter, American Society for Metals, and reported exclusively for MODERN MACHINE SHOP.

the machine made it desirable. ould be hung from a flexible cable be made portable. In other words, he operating point for the electrical guipment could be located as closely possible to the mechanical operatng center.

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It is doubtful if the multi-motored pachine would ever have been develmed into its present form without availability of magnetic controls . HARPER make it function. In days gone by, e planer type milling machine, for stance, had one large motor on top the cross girt which drove all four eads through a complexity of spline d be used otected of hafts, screws, gears, and so on. ne wrong reaking this down to individual moors did not necessitate magnetic to be so entrols, but when it became necesle motor ary to insure that one or more spinthe feed as were running before starting the so that it wed, or slowing down the feed if the

mples are utters were over-th us, but baded, then magfor the etic control was ontrollers he only solution.

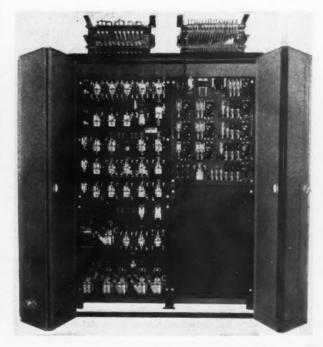
ng would It should not be tion with ssumed from the oregoing that there ange was 8 no field for manoility ob. al control. ces. This he contrary. In examples mall sizes where estion of the devices are operate ot too bulky. any are still used.

en of the rersing D-C M Millerr had to uding Control for aner Motor, Feed Mot, Rail Motor, Rapid haracter raverse Motor, Rail amping Motor, Clutch loter, Spindle Motor, d Pump Motor. Ap-toz. 113 In. High; 70 p. Wide; 27 In. Deep.

For certain intermittent movements not interlocked with other functions. such as tool carriage traverse, small drum switches are still in use, arranged to stop the motor as soon as the handle is released.

Manual switches are often employed for infrequent speed changing on multi-speed A.C. motors. Even some modern lathes with D.C. motor drives frequently have drum switches operated from the carriage through splined shafts. Manual starters are often used for small pump motors where they give overload protection and where they can even interlock the main drive, if the latter is magnetic, by providing an extra contact so that the pump motor must be running before the main drive can be started.

These examples do not alter the basic fact, however, that electrified machines would never have achieved



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Pendant · Type Push Button Station with Anodic Finish and Rod-Operated Stop Button

their present stage of development if we had had to depend on manual controls. A real progressive step, therefore, consisted in the intensive effort which was put by the various electrical builders on the development magnetic controllers, and with them the necessary accessories such as push buttons and limit switches. Our

discussion of progress in control is, then, largely that of magnetic control development.

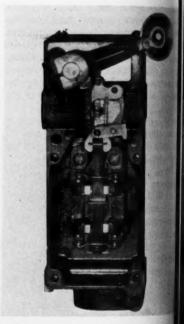
Not the least important in this connection was the reduction in size, particularly for small alternating current starters for full voltage starting of polyphase motors which still form the majority of machine tool starters.

Twenty years ago a full voltage starter for a 5-hp., 220-volt, 3-phase motor was approximately $11\frac{5}{8}$ inches wide, $13\frac{1}{2}$ inches high by $6\frac{3}{8}$ inches deep. About 1927, the size was reduced to $6\frac{3}{4}$ inches wide, $9\frac{5}{16}$ inches high, and $4\frac{3}{4}$ inches deep. Just recently there has been a further reduction to $6\frac{3}{8}$ inches wide, $8\frac{1}{2}$ inches high and 4 inches deep. At the same time the price has dropped from \$28

in 1922 to \$16 at the present time

Not only was the size reduced by the appearance was changed much for the better. The old switch was a rectangular box, which did not look well on any machine. Today's switch its rounded corners is much more adaptable to machine mounting, and blends in better with the machine contours.

This reduction in the size of divices made it possible to make a control panels small enough to be a cated in machine bases, or, if he were put outside, they could be to



Track-Type Snap-Action Limit Switch, out Cover, With Lever and Contact in Normal Position

be suited to the machine's desirable They also helped when it came making up large floor mounted pels for multi-motored machines. It trols to take care of a number motors, with the many interlock

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• The job shown is a sample of the heavy work this Super Service Radial performs in the building of massive rolling mill equipment at the plant of United Engineering and Foundry Company, Vandergrift, Pennsylvania

For reasons explaining this machine's superiority, send for Bulletin R-24

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November, 1940

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MODERN MACHINE SHOP , 81

NEW AND DIFFERENT

The new STAR Unbreakable Special Flexible Heck Saw Blode is different from every eagle—different in looks, different in perfermence, different in boot-treatment, different in steel.

PERFORMANCE

Extreme Sacissity with existents ing toughness result from the use of a new kind of steel and heat treatment. The new STAR Unbreakte shale Special Fristikle is governabled unbreaktein in use in a frame—ne hlude loss due to bonding, twisting, or cramping, it is a Statish bade with the qualities of an oil-hard blade—lasting cutting questions.

METALLIC FINISH

For the first time a tungston blade is colored off ever—not only with a protective (parented) metallic finish to prevent reining, but with a distinctive green finish to previde immediate customer identification and unless display value. Only the green blade in a STAR Tuneston likedo.

COMPLETE

For the first time on any aragates bloods the length, number of tests, type, make, thickness and width are plainly stamped in clear marking. This holps in proper blade selection in selling—as well as during use.

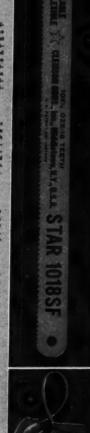
BETTER IN USE

Here is a new blade, unsurpressed for floribility and roughness, with an improved flatish, having class marking, and packed a in the acclusive STAR modern metal has lithe graphed in colors—ne wander we can say it's better in use.

STAR pinnered with the first "Moly" blade with the all-over copper finish—new STAR loads with the first longston blade with on



CLEMSON BROS., NOC., MIDDLETOWN, N.



relays required, would require a prohibitively large panel were it not for the availability of these small devices.

All the advantages of magnetic control would have to "blush unseen" if we did not have push buttons and limit switches to guide the control in the way it should go. Old time push buttons were twice as big, or even bigger, than present forms. Frequently the push button is about the only evidence of electrical operation, and now even it can be made inconspicuous.

For many years push buttons were available only as complete stational For machine work, however, there was a definite need for individual units which could be incorporated in the machine design. When these were made available, they were also obsproof and arranged to be mountable by merely drilling a hole, making their use simple and effective. Units were also brought out which included indicating lights in the button itself, thus saving an additional unit.

A development of recent years has involved push button stations of the pendant type. Years ago a two-or three-button pendant station was the only type available, and that usually was built for wall mounting and supplied with conduit fittings. Now pendant stations are listed up to I units, and many special ones have been built which include selector switches, indicating lights, and ever speed-indicating instruments.

The reversing planer drive is a good example of this development. In the early days of planer electrication the moves the operator had to make paralleled very closely his motions with the old belt driven michines. He started and stopped to platen by leaning over and setting the reversing master switch in mertral as he had been accustomed to it.

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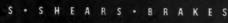




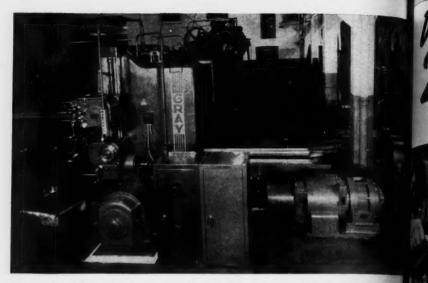












Gray Double-Housing Planer, 42 x 42 In. x 12 Ft., Driven by G-E 35 H.P. Variable Yellow Planer Drive with Speed Range of 40 to 1.200 R.P.M. on Motor, Giving 8 to 240 Ft. Pri Platen Speed, as Set Up in Plant of the Warner & Swasey Co., Cleveland, Ohio.

with his belt shifter lever. He inched the machine by means of a two-button pendant station, but not until after he had operated a transfer switch, usually around on the side of the machine.

Now all functions, both automatic and inch, are obtained from a 5-button pendant switch—or even from two, one on each side of the planer—if it is large. Strange as it may seem, there was opposition to the use of the pendant, many preferring to stick to the old method of control.

Many other machines—large milling machines, horizontal boring machines, boring mills and others—are now controlled wholly or in part from pendant or portable stations having as many as 25 or 30 push buttons, selector switches, and indicating lights.

Limit switches form another very important group of accessories which have progressed in the past few years. With them, as with other control, the trend has been toward and ler but more rugged and more gas ally useful devices. Latest developments include snap-action swild in which alnico permanent maps are used to get accurate points throwover and which have stood under millions of operations.

Switches much smaller than a thing before available have a made up with various types of a ating heads to meet numerous quirements of mounting and proof enclosures to make them suitable for the conditions encountered on machines.

Small switch mechanisms been produced which can be mout in the machine, for operation levers in the machine, and the make a very compact installation such a case the machine has serves as the protecting enclosure the switch.

N TURN I

Would a 20% Time Saving Juterest You? Here are two of the many wasterness.

Here are two of the many varied jobs turned out at the American Floor Surfacing Machine Co., Toledo, Ohio. The operations call for grooving, necking, recessing and facing on a wide variety of parts.

With the old style slide tool, much time was wasted in winding and unwinding the fine pitch screw of the tool. It was replaced by a new Warner & Swasey Quick Acting Slide Tool. Immediately an average saving of 18% to 20% in production time was effected. Furthermore, the rigidity and accuracy of the new tool enables flat faces and shoulders to be turned quickly.

The accompanying blue prints of these two typical parts show the details. If you do grooving, necking, recessing and facing, put aWarner & Swasey Quick Acting Slide Tool on your machine. You may save more than 20%. Why not find out today? Write

18% to 20% Time Saving on These Jobs with the New WARNER & SWASEY Quick Acting

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Here's the latest design. Compact, streamlined Here's the latest design. Compact, streamlined Miller for precision work on smaller parts. Equipped with screw feed. As an extra, it embodies a longitudinal power feed which includes two 3-step cone pulleys, bracket for adjusting belt tension, telescoping drive shaft with universal joints and fully enclosed worm and gear. Fully enclosed variable speed drive, with correct spindle speeds for every job. Choice of two standard speed ranges: 100-1,000 r.p.m. or 150-1,500 r.p.m. Heat-treated steel ground spindle mounted on Timken tapered roller bearings. Pyramidal base. Overall height 60". Weight 750 lbs. The vise and adapter for bolding end-mill cutters can be furnished as holding end-mill cutters can be furnished as

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IZONTAL MILLING MACHINES. MACHINES & JIG BORERS, & 11" SHAPERS

MACHINERY MANUFACTURING CO.

3636 IRVING STREET, VERNON, LOS ANGELES, CALIFORNIA

Motor-operated field rheostats an quite old and common, but it has an been within the past three or for vears that a compact, inexpension mechanism which can be used a small machines has been available This drive can be used on platety rheostats or dial-type rheostats an can readily be incorporated in a control panel design. This makes it simple matter to obtain speed adjust ment by remote push button control as for instance from a pends switch.

In conjunction with a simple tachometer and instrument, the operator can always know just what operation he is getting. These mechanisms and a place on plate planers, horizontal boring machines, boring mills miling machines, and any other place where it is desirable to control a D.C. motor speed from a distance.

To make the wiring up of machine more trouble free, especially when of is present, a new type of wire insultion unaffected by cutting or lubricating oils has been put on the market in the past few years. Literally miles of this wire have been used in wiring machine tools. Over a mile was used on one large boring mill alone. This wire is available in nine standari colors, so that the tracing or circuit can be simplified. It is also acid and moisture-resisting, with longer life and has a smooth finish so that dirt will not adhere to it.

Definitely new methods of control have been improved or developed. In Ward-Leonard or "variable voltage" scheme of speed control has been known for many years. Only limited applications had been made of it principally in large installations such as steel mill main drives and min hoists. It was relatively expensive requiring a 3-unit motor-generalize set regardless whether A.C. or DA



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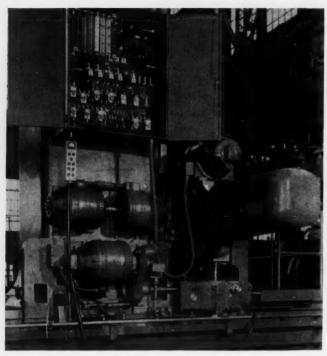
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Sellers Horizon Boring Machia Equipped with Appropriate Per and Traverse D Giving 25-to-1 & Range and 60 h Overall Range. I Feed Motor, 3/5 H.P 450/1,800 R.P.M., 23 Volts; D-C Spins Motor, 25 H.P., 1,79 R.P.M., 230 Includes Portable Push-Button Station for Complete Contro of Machine and Mo tor - Operated Field Rheostat for General tor and Feed-Motor Fields

power was available, and this worked against it.

The actual control requirements in the way of relays, and so on, are somewhat simpler than for constant-voltage drives. The control has definite inherent advantages such as the possibility of a wide speed range and admirable accelerating characteristics. Because of these its field of application has been increasing of recent years.

Now many machine tools are provided with variable voltage motorgenerator sets in fractional horsepower capacities. Grinder headstocks, grinder and milling machine tables, horizontal boring machine feeds and traverses, and reversing planer drives are recent instances of the use of this old scheme in modern machines. In some cases a combination of Ward Leonard (or generator field control) and motor field control makes it possible to get speed ranges as high as 30:1 or 60:1 in special applications.

The Ward-Leonard scheme basically involves the operation of a D.C. motor over a speed range by varying the voltage applied to its terminals. This variation in voltage is obtained by changing the excitation of the generator supplying power to the motor. This, of course, means a generator for each motor whose speeds to be varied. The method is known by various names as Ward-Leonard variable voltage, adjustable voltage, or generator field control—all meaning the same thing.

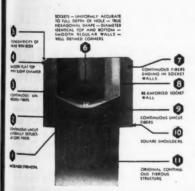
An entirely new control method, still so new that few applications have been made on machine tools as yet, but which is used rather extensively in other industrial applications, is the use of vacuum tubes. Certain combinations have been widely used. The popular "electric eye" has found

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G-E Magnetic Controller, Approx. 24 In. Wide x 17 In. Deep. View Showing Push Buttons, Speed Indicator, Indicating Light, and Selector Switches

many industrial applications such as for keeping the threads straight in weaving cloth, registering in printing, perforating stamps, and the like. A timing relay incorporating a vacuum tube for the timing element has been successfully used on a tain machines where a definite time function was required. have been applications where matic remote speed control of pe motors has been obtained by of a thyratron tube controlled thm a cam-operated reactor. tempts have been made to use as uum tube as an intermediary to m mit operation of motors over a range directly from A.C. power. so far nothing has been entirely factory for use with the comm used sizes of motors. Neither don ent tube characteristics lend the selves to applications where the w has to be changed suddenly, as m be the case on most any machine erating on an automatic cycle.

The principal element of proper in machine tool control has been be gradual development of devices a combinations of devices which makes

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ALTER EGO: Literally "one's other self"—the still, small voice that questions, inspires and corrects our conscious action.

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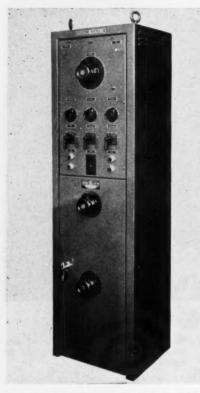
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it possible to operate complex machines with the greatest ease and with maximum flexibility in securing the functions desired.

A plate planer is usually a comparatively simple machine, yet in the



Operator's Control Panel for Use with Miller-Type Planer Control Panel

last five years, six or eight of these machines have been built with elaborate electrical equipment. As a result, the operator, riding on the carriage, has entire control of the machine from a master control panel in front of him. This panel contains push buttons for inching or automatic operation in either direction, speed change through a motor-operated

rheostat, complete control of feed in traverse motions of the tool head selector switch for tool lifter control and carriage speed indicating instrument. Feeds are readily adjusted in a feed limit switch which permits in feed motor to run only a preselection amount at the end of the stroke

Several horizontal boring machine practically 100 per cent electrical have been built in the past two of three years. In these, complete on trol is obtained from a portable publication station which includes a feed speed indicator and push buttons for changing speed. A feature of the machines is a variable voltage (Ward Leonard) drive for the feed moing giving feed speeds of 1-30 inches per minute, obtained from the same equipment by merely pressure a traverse button.

Milling planers have perhaps to most complex requirements of an present-day machine tool. An entire master control panel is required for the various rheostats and interlocking selector switches necessary for setting up the different combination needed. After these have been set up the operator has control from an eight-button pendant push button.

The examples mentioned have been all large machines where the size of the electrical controls is correspondingly large and impressive. Smaller machines, such as milling machines and grinders, may not present such an imposing appearance, but the functions required of them and secomplished by the aid of the electrical equipment are just as spectacular. In many instances the type of operation is the same, the only difference being that smaller units are used. The electrification of these machines has been much expedited by the de-

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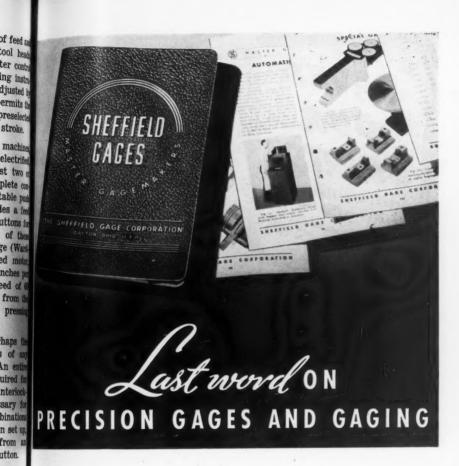
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"SHEFFIELD GAGES" just off the press is a comprehensive presentation of precision gages—design, construction and application together with standards and constants useful in practical inspection work.

Manufacturers engaged in the manufacture of engines, machine looks, automotive or military equipment, or any enterprise where inter-changeability of parts is essential, will find this book very useful.



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A small Mid-Western shop contracted to cut an order of tubular bearing shafts The contract price was based on a output of two cuts per hour on a power machine. Before the job was fairly

started, a check disclosed a rate of but a single cut per hour! The owners faced serious loss on the contract—with a machine tied up for several weeks on a hope less job.

Someone remembered a local demonstration of an Atkins Curled Chip Circular Metal Saw. One was secured, tried on the machine, and on the advice of an Athin representative, ganged up with a second saw. The result: an increase in cutting rules to TEN CUTS PER HOUR—ten times the previous rate—and a better profit on the job than originally figured.

Your type of work may be quite different—but if it comes under the heading d "cutting metal" with power saws-any commercially machineable metal-whether or contract for some one else or on your own production line—you'll do well to get the

whole Atkins Curled Chip story.

Try one of these remarkable new saws in your shop, where you can see first-hand what a new principle of tooth design as applied in Atkins Curled Chip Saws has done to lower the cost of cutting metal

The Curled Chip System of Metal Cutting ATKINS Silver SAWS

E. C. ATKINS AND COMPAN 466 S. Illinois St. INDIANAPOLIS

MODERN MACHINE SHOP

November, 1940

Hints on Control of By G. G. LANDIS Cleveland, Ohio Expansion and Contraction in Welding

USE of proper welding procedure, which involves the sequence of beads, number of passes and current, is the surest way to control expansion and contraction. For one example, a bead six or eight inches long is deposited on a perfectly flat plate

rection indicated, due to the fact the metal at the bottom is also heated to a high temperature. Somewhere between these two extremes exists the condition that will produce a maximum warping in the direction indicated.

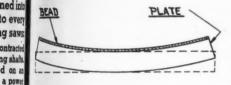


Fig. 1—Dotted lines indicate position before welding.

Another example is found when two pieces are welded together at right angles with a bead on one side. After the weld has cooled it will be found that the plates are not at right angles and that the weld has pulled the pieces toward each other in the direction of the weld, as shown in Fig. 2.

and allowed to cool. As it cools the bead will tend to contract and if the plate is not too thick so that it can bend under the stress imposed and it is free to move, it will curve or bend up in the direction of the bead as shown in Fig. 1.

When two plates with an opening

A bead deposited from a small electrode with low current will cause very little warping due to the relatively small amount of metal which is heated to a high temperature. On the other hand, a bead deposited from a large electrode with a high value of current so as to produce nearly complete penetration of the plate will cause very little warping in the di-

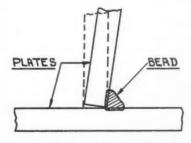


Fig. 2—Solid lines indicate position after welding.

between them are welded with bare or washed electrode, the plates will draw together as the welding progresses.

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THE DOUBLE LOW HUNG SPINDLE DRIVE OF THE "AMERICAN" 32 SPEED HOLE WIZARD

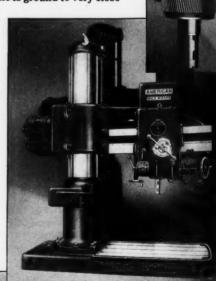
is the newest thing in spindle drives—is a masterpiece of engineering and adds years to the effective life of the machine.

It consists of two gears located on the lower portion of the spindle at the bottom of the head, thus bringing the driving gears as close as possible to the work. By using two driving gears, a large one for the low speeds and a small one for the high speeds, severe operations are performed at low tooth pressures and high-speed work at low gear velocities. This ideal combination cannot be secured in any other way.

Spindle and spindle sleeve are of "Nitralloy" steel nitrided for extreme surface hardness. The spindle is ground to very close

limits and the sleeve is honed to precision limits. These units being hardened are practically impervious to wear. The hardening of these members also permits a much closer fit, resulting in a precision mounting that lends itself to the most accurate drilling and boring for tool room operations.

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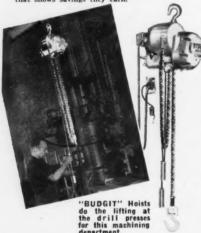
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This fact is illustrated in the skets Fig. 3. The amount will depend up the speed of welding. As a rule, in greater the speed, the less the amount draw. It is possible to find a speed at which the plates will not draw to gether.

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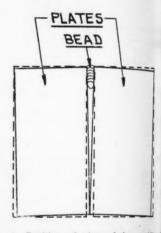


Fig. 3—Position of plates before welding indicated by dotted lines. Solid lines the position after welding.

inches to 18 inches ahead of the web ing proves very satisfactory. Allowance may be made for contracting if possible, by separating the plats

For usual plate thicknesses the plates should be separated approximately ½-inch for each lineal for of weld. The exact amount is difficult to state, as it will vary with different jobs and conditions. Experience is to best teacher on this, but the amount suggested will serve as a guide.

If the welding speed is further in creased, as when using shielded an electrodes, the plates will separal while welding proceeds, as indicate in Fig. 4. In this latter case it is be necessary to tack or clamp in

FOR HARDINGE SECOND OPERATION MACHINES

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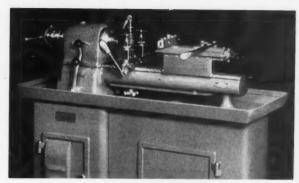
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HARDINGE GOLDEN ANNIVERSARY YEAR

ends together before beginning the welding, as shown in Fig. 6.

If a plate is veed for welding and

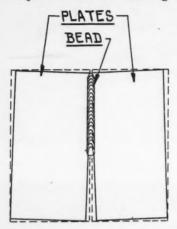


Fig. 4—Dotted lines show original position of plates. Solid lines indicate plates after welding at high speed.

then welded, it will frequently be found that the plates will be drawn up as shown in Fig. 5. This is true since the greater opening is at the top and more molten metal is deposited and a wider zone heated on this side, consequently there is more contraction.

The amount of warping will vary almost directly with the number of passes, being greater for a greater number of passes. This will also be true of the case illustrated in Fig. 2.



Fig. 5-Original position of plates is indicated lines. Position after welding is shown by solid lines. by dotted lines.

In other words, it is generally advisable to complete the weld with a minimum number of passes.

If the plates or parts welded are

free to move, there will usually be some distortion which must either h overcome or steps taken to redu the effect. When the parts are my free to move; that is, when the ton of the vertical member shown in Fig. 1 is restrained, the weld will try to will try pull it over, but since it cannot come either the weld must stretch or the plates will bend. In the case shown in Fig. 6, if the welding speed is high HES. the plates will tend to pull apart while the welding is in process. However, after the plates have cooled down it will be found that at both ends the plates are tending to press together, and consequently the weld metal is under compression near the ends and in tension near the middle in the transverse direction. In the longitudinal direction, all the weld

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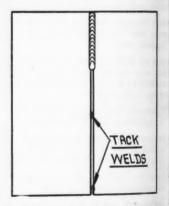


Fig. 6-Welding speed that is too high cause plates to pull apart.

metal and base metal immediately adjacent to the weld are under tension.

If the welding speed is slow, the plates will tend to pull together while the welding is being done, but it will the welding is being done, but it will be in the welding is being done, but it will be in the welding is being done, but it will be in the welding is being done, but it will be in the welding is being done, but it will be in the welding is being done, but it will be in the welding is being done, but it will be in the welding is being done, but it will be in the welding is being done, but it will be in the welding is being done, but it will be in the welding is being done, but it will be in the welding is being done, but it will be in the welding is being done, but it will be in the welding is being done, but it will be in the welding is being done, but it will be in the welding is being done, but it will be in the welling i be found that the stresses are set up in the same direction as de scribed above. Thus it will be seen that the stresses in a welded struc-

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ually be ither b redu are no e top of n Fig. 2

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ture may have different directions and amplitudes while the welding being done than after it has cook down.

In heavy sections; that is, when welding is to be done on both side it is desirable to alternate welds, ting a bead first on one side, then a the other. This tends to prevent distortion, and balances the stresses.

Where the distortion will cause

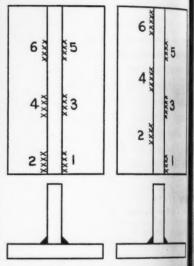


Fig. 7 and Fig. 8—Examples of two sequents of welding often used to prevent accumulation of stresses and distortion.

trouble, it is desirable to make a study of the job and arrange the welds in a sequence that will keep distortion to a minimum. For a ample, if two pieces are to be welded at right angles, a sequence of weld as shown in Fig. 7 tends to reduce distortion. The sequence may be varied to suit the job, and some authorties recommend a sequence similar to that shown in Fig. 8.

Skip-welding is a very effective way to prevent distortion and reduce locked-up stresses. This method con-

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MODERN MACHINE SHOP

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sists in keeping the expanding zones sufficiently narrow and sufficiently close to the contracting zones so that they tend to stress-relieve or neutralize each other. This can be accomplished by making a short weld, then skipping some distance ahead and making another similar weld, following this procedure for some distance and then returning to the first weld and making another weld adjacent to it, and repeating the process. Suffi-

cient time should elapse between making adjacent welds so that is first weld is sufficently cool and contraction.

The "step-back" method of welding is a method of distribution of well and procedure of making welds a culated to prevent the accumulation of stresses and distortion. The method involves not only breaking up to welds into short sections, but is dependent also upon welding in the proper direction. This point is illustrated in Fig. 9. The welds may be broken up. For example, the well

6 5 4 3 2 1

Fig. 9—Example of a procedure and segue of welding by the step-back method.

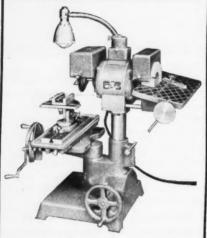
may be made in the order 1, 2, 3, 4, 5, 6 and so on, or 1, 3, 5, 2, 4, 4. The latter is an illustration of the "skip-step-back" method, which is a combination of "skip" and "skip back" welding. In "skip-step back welding, welds may be made in an convenient order.

It is impossible to formulate rule for controlling all forms of distriction and stresses, but it must be not ognized that these are usually preent in welding. Each job must be studied to determine the best procedure to follow for the method of welding employed.

The accompanying sketches and examples are, of course, somewhat exaggerated, so as to illustrate better the points under discussion.

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The General-Purpose Use of Carbide Tools, 1v

Selecting Carbide Grades

By JAMES R. LONGWELL Detroit, Michigan

A PREREQUISITE to the generalpurpose use of carbide tools in
the shop is the selection of a minimum number of grades for a wide
nage of work. The large number of
diversified grades of carbide offered
by carbide suppliers admittedly tends
to be confusing to the average user
of this tool material. However, when
the reason for this diversity of grades
becomes known, the matter of grade
stection becomes more simple.

Perhaps the easiest way to explain his is to point out that approximateby 85 per cent of all carbide tool machining work is done with two grades of carbides!

Why then are there so many grades of carbide available? The answer lies in the fact that the need arises principally in the case of quantity-production operations. Most of the grades available are grades that have been developed to fill certain designated needs.

Let us cite an example to illustrate the use of these "special" grades: A manufacturer may be employing carbide tools for a certain machining application comprising a



cheral purpose use of cartice tools is made possible by the we of a minimum numter of grades for broad use throughout the shop. For example, on the operation illustated, two carbide grades of most of the work on 2,000 mall-lot machining applicastraight-line, quantity-production job. The carbide tools stand up for 7 hours-just one hour short of a full 8-hour shift. Obviously, in such a case, it would appear advisable to seek a grade of carbide having a longer life between grinds-sufficient to permit continuous operation for the full shift.

Experimental work to discover which carbide grade has the longest life would in this case be justified in order that machine "down" time for tool changes might fall between shifts.

Prolonged Tool Life Not Essential On Short-Run Work

The situation suggested above, however, is not a problem to those who propose to use carbides as a generalpurpose tool material throughout the shop on jobs consisting principally of short-run, diversified work. such conditions, where the job lot ranges from perhaps 6 to 150 pieces, a carbide grade that will machine 1,000 pieces per grind instead of 900 pieces offers no advantage. In such shops, the best grades to use are those that will give the best average results on a large number of diversified jobs.

Special-purpose grades have no place in this picture; general-purpose grades are the type to employ. using general-purpose grades, and tools designed for general - purpose use, the expenditure necessary to maintain an adequate supply of carbide tools is held to a minimum and the inventory problem is considerably simplified. Most plants that have adopted the general-purpose use of carbides have found that from 4 to 8 styles of tools and two grades of carbide-one for steel and the other for cast iron, and similar metals-will do the bulk of the work passing

through the shop.

Although carbide suppliers are prepared to recommend the best general-purpose grades for a given class of work, it is well that the user understand the basis upon which grades for this purpose are selected.

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Assuming for the moment that the proper type of carbide content will be used, the two important factors to be considered are the strength and the hardness of the grade. These vary in inverse ratio. In other words, as the strength of the carbide is increased, the hardness is decreased and vice versa. However, it should be borne in mind that the "softest grade of carbide is far harder than the hardest steel, and varies but few points from the hardest carbin grade. The strength of the carbide i of course the "safety" factor, en abling it to resist the shock of opention. The hardness of the carbid might be called the "endurance" fac tor, enabling it to resist wear an thus prolonging tool life between grinds.

Grade for Diversified Work Should Give Best Average Results

By varying the strength and hard on" again ness characteristics, it is obvious that a wide range of specific condition be of t can be met. For example, on temps, quantity-production, high speed, light ations, cut application, one of the hards omical grades capable of long life would On the other hand, for indicated. large, heavy-duty work, a less har large, heavy-duty work, a less han be title of but stronger grade would be advis 7 Danly able.

In selecting grades for general in interesting in i purpose work, however, the objective purpose work, however, did and the prings, so is to strike a happy medium and the prings and the prin Usually the most suitable grade is one that rates high

November, 194

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				Grade						
	Hard (No Alloy)	4	150-250 200	44A 883	150-250	883 905	150-350 250	883 905	150-350 250	883 905
CAST IRON	Medium (No Alloy)	3	200-300 250	44A 883	200-300 250	883 905	200-350 250	883 905	200-350 250	905 883
	Soft (No Alloy)	3	200-350 250	44A 883	200-350 250	883 905	200-350 250	905	250-450 300	905
	Hard (Alloy)	4	150-250 200	44A 883	150-250 200	883 907	150-350 250	883 905	150-350 250	883 905
	Medium (Alloy)	3	150-250 200	44A 883	1 50-250 200	883 907	150-350 250	883 905	150-350 250	883 905
	Soft (Alloy)	3	200-350 250	44A 883	200-350 250	883 907	200-350 . 250	883 905	250-450 300	883 905
	Up to 25% Semi-Steel	3	150-350 250	44A 883	150-350 250	883 907	150-350 250	883 905	150-350 250	883 905
	Over 25% Semi-Steel	4	100-250 200	44A 883	100-250 200	883 907	150-350 250	883 905	150-350 250	883 905
	Brake Drums Heat-Treated	4	150-350 250	44A 883	150-350 250	883 907	200-350 300	883 905	250-450 350	883 905
	Brake Drums Centrifugal	4	150-350 250	44A 883	150-350 250	883 907	150-350 250	883 905	250-450 350	883 905
	Chilled Rolls	5	10-45 15	44A 883	10-45 15	44A 883	10-45	44A 883	10-45 15	883 905
E.E.	Hard	5	100-200 150	44A 883	100-200 150	883 907	150-250 200	883 907	150-350 250	883 907
RON	Medium	4	150-250 200	44A 883	150-250 200	883 907	150-350 250	883 907	150-350 250	883 907
MALLEABLE	Soft	3	200-350 250	44A 883	200-350 250	883 907	200-350 250	883 907	250-450 300	883 907

usist in selecting proper carbide grades, charts like this are available covering all types of untrials and operating speeds, feeds, and so on. Bold figures indicate best AVERAGE grade. Light figures indicate alternate selections when improved results are desirable.

trength so that a good margin of safety" is provided to act as a "cushand hard m" against accidental abuse and the clous that everity of heavy duty application. ondition the of this high-strength grade will e, on temaps, on certain light-duty appli-ced, light ations, fall short of the most ecoe hardenmical grade possible, but the net

overall result throughout the shop will be extremely worthwhile.

The exact content of the grades selected varies, of course, according to the supplier, but it will be found that the tendency is to incorporate the principle outlined here in the recommendations made in all cases.

and, for nand, ¹⁰ "reanles in the Production Line" is less hard be title of a four-page folder released be add 7 Danly Machine Specialties, Inc., 2122 and Ave., Chicago, Ill., showing in interesting manner the cost of varigeneral objective lies. These supplies include dowel pins, and of prings, socket head stripper bolts, socthe he at head cap screws, gooseneck clamps, the less thead cap screws, goosened the less than the less un gages, and so on. Copy of folder ree upon request.

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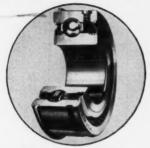
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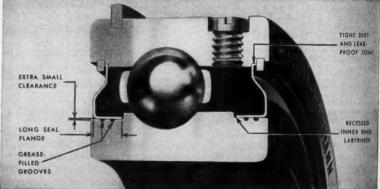
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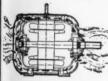
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INANY machine shop the cost of maintaining open type motors is likely to be excessive because the metallic dust in the atmosere collects on the windings causing frequent shut-downs for the collects on the windings causing irrequent shared maintenance is to use motors that are designed and constructed for this lied of service. The Wagner type CP totally-enclosed, fan-cooled motor was especially designed for operation where metallic dust, and the service was especially designed for operation where metallic dust, and the service was projected for the service are prevalent. slings, chips, corrosive gases, moisture, fumes, etc., are prevalent. These elements in the atmosphere may cause motor failure with ordinary motors, but are harmless where Wagner CP motors are used. Wagner CP motors are self-protected against all such de-suctive agents and therefore give dependable service despite these severe operating conditions. Experience has proved time after time that motor protection costs less than motor maintenance. You will be money ahead if you standardize on Wagner CP motors thruout your plant.

The Two-Frame Construction Keeps Dust, Dirt and Metal Chips from Entering the Vital Parts of the Motor -



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Examine the cross-section drawing of the Wagner CP totally-enclosed, fancooled motor illustrated at left. There are two frames - an outer frame that guides a strong cooling draft over the motor, and an inner frame with clearances around the shaft only, through which nothing obstructive or injurious can enter the vital parts of the motor.

Three-way bydraulic drilling and reaming machine operated by four Warner CP maters



Ten Wagner CP motors operate this large polishing machine

Get COMPLETE INFORMATION

complete information or mer type CP motors write for ean MU-182. If you have any grodo with the selection, oper or maintenance of motors tould have a copy of this val

25 SALES AND SERVICE BRANCHES

Wagner maintains 25 sales and service branches conveniently located throughout the country. Trained sales-engineers are al-ways ready to assist you in se-lecting the exact motor for your equipment.



Another large boring and drilling machine powered by Wagner CP motors

Wagner Electric Corporation

6400 Plymouth Avenue, Saint Louis, Mo. U.S.A.

TRANSFORMERS

FANS

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MOTORS

lovember, 1940

MODERN MACHINE SHOP

111

Sofety Precautions for Safe Working in the Plant

By ERNEST W. FAIR

EVERY year the lives of scores of workmen in manufacturing plants are claimed in accidents which, in many cases, are caused by the entanglement of clothing in the ma-Whatever the mechanic's chinery. job, he should be taught to conform to certain rules regarding the clothing he wears in the plant.

The greatest of all mistakes is the habit of wearing "Sunday clothes" on the job; using old, frayed trousers, and so on. The lack of necessity for good appearance never justifies the wearing of ragged or worn - out clothes in the shop. Wherever wheels turn, or belts or chains move, or shafts revolve, the possibility exists for an edge of loose clothing to become entangled and bring about a serious casualty.

Long, loose jumpers, coveralls, or overalls are potential hazards in a machine shop. The safest garment is, of course, the one-piece overall or coverall which fits the wearer. Neckties have no place in the shop unless they are held in place by a vest or are of the bow type.

Sleeves are safest when rolled above the elbow or, better still, cut off at that point and hemmed to prevent fraying. Gloves are permissible and even advisable on some work, but never in the operation of machine tools. Thousands of machinists have lost fingers and hands as a result of wearing gloves at work on machine tools. Good shoes, with solid soles, are essential. Worn and frayed shoe soles will pick up steel shavings and

chips easily, and man feet have been cut shavings that cut throw holes or thin soles on the bottoms of old shoes.

Cleanliness as regard clothing is also an in portant factor in safety

Not only do dirt and oil shorten th life of a garment, but the oil presen in the dirt is a constant fire menao

The wearing of finger rings in th shop constitutes a potential source of danger, and many fingers have su fered bad injuries where the injurie might have been light if the victim had not been wearing rings. Rins should be taken off when the work ing clothes are put on.

Although the importance of safet in industry has been stressed ever where in America during the pa twenty years, there is still room to attention to the details listed above

Controls for Machine Tools

(Continued from page 92)

velopment of smaller control units various types which made it possib to include the control inside the m chine base in many installations.

The development of new and be ter machine tools goes hand-in-han with developments in electrical of trol and motors. Without the aid the electrical devices modern m chines would be far more compl cated both in operation and to con trol than is now the case. In fact, is doubtful if some could even built unless electrified. The moral put the power source as close possible to the load, and the contr unit where the operator needs it.

SHOP MEN ask for ROSS/14LVES

The Man at the Machine knows that his Ross Valves assure steady, uninterrupted production...that they are easily installed...and, in emergency, swiftly serviced.

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Bring your air control problems to Ross

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SIZE AND TYPE FOR EVERY OPERATION



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Modern Equipment at Work

Inspecting Oil Producing Equipment

N extension of its policy of 100 per cent inspection of all equipment manufactured for use in connection with oil field work has been put into effect by the Jones & Laughlin Steel Corporation, Pittsburgh, Pa. Newly-developed inspection methods involve the use of a recently-developed instrument called the "Tubewall-scope," and a new application of the Magnaflux method, both of these developments being used to inspect, during production, both the interior and exterior of every length of "Blue Ribbon" seamless steel integral joint drill pipe, an exclusive product.

The Tube-wall-scope fills a longfelt need for an accurate, scientific method of inspecting the inside walls of tubular goods for defects which eventually might result in pipe failures in the field. The Tube-wall-scope is a precision instrument resemble an unusually long telescope. It equipped with an adjustable for eyepiece at one end and a series special lenses, reflectors, and a secially-designed high power light at the other. The lenses are arranged to permit the operator to inspect the complete 360 degrees of circumfer ence inside any tube as the Tube-wall scope is pushed slowly through the pipe. A guide on the barrel center the instrument accurately.

The Tube-wall-scope magnifies the image of any defect encountered its travel through the tube, making it easy for an experienced inspector of the quickly recognize a flaw.

Every length of integral joint dri pipe now being produced by the J&I mill is also subjected to the Magna flux test. A feature of this drill pip is a forged upset tool joint integra with the pipe itself, which eliminate the conventional-type tool joint. The



Permitting Inspection of the Complete 360-Degrees of Circumference of the Interior Wall a Tube or Pipe, the Tube-Wall-Scope Fills a Long-Felt Need. By Magnifying the Size of Image of a Defect, the Instrument Helps the Operator to Quickly Recognize a Flaw. In Test Will Go Far Toward the Elimination of Fatigue Breaks on the Job

ON ork A new grinder equipped with the second precision spindle is positive. assurance of good performance and long Precision Spindle is built with Precision Bearings designed and used solely by Excell-0. resemb They minimize end and radial play, do not generate excessive heat, and pe.

life-for

do not generate excessive field, and very field with the second of the s standary for exceptionally long periods, without any adjustment or replacement.

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The installation of an Ex. Cell-O Precision manufacture of an excelled Precision of an old grinder is frequently andle on an old grinder is frequently and maintenance problems. Invariably and maintenance proprents, improved I means increased production, improved the more wheel life. To select the mish more wheel life. To spindle for correct Ex-Cell-O precision to Ex-Cell-O precision. your present machines, write to Ex-Cell-O your present machines, write to Ex-Cell-O for cololog No. 5-537. It covers a wide range of practical spindle information.

Precision

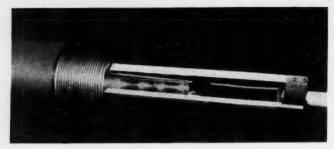
MACHINES AND TOOLS **EX-CELL-O CORPORATION** 1206 Oakman Blvd., Detroit, Mich.

Please send me Catalog S-537 on Ex-Cell-O Precision Spindles.

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Tube - Wall - Scope i Position for Insper ing the Interior W of a Length of Jal Blue Ribbon International Joint Pipe. The Tale Wall - Scope Permi the Inspector to D tect Small Crack or Pits Slivers, the Wall of the F

Magnaflux test is applied to the exterior of this forged upset to detect defects not visible to the eye, thus reducing the possibility of failures at the joint.

The test consists of placing the pipe in a magnetic field and then sprinkling the pipe with a metallic powder or solution. Even though not otherwise visible, the powder-which is red in color-is attracted by the magnetic action due to the presence of a flaw and instantly collects over the

Thus flaws are discover defect. which could not be located by a other means without injuring t workpiece to an irrepairable der After the inspection has been me the powder is easily dusted from t workpiece.

The development and application these inspection operations is exper ed to go far toward reducing t number of failures of equipment the field, thus saving the losses production which occur when a w

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· Yes, practically immune to shock-bump-proofl-and costs LESS, even if the price is more than ordinary casters. On your trucks, dollies or portable equipment this caster will still be giving LIKE-NEW PERFORMANCE when cheaper casters would need replacement.

· Write for Free Plant Survey.

This Is ForgeWeld Designed to be unbreakable - to carry loads of 1,600 to 3,600 lbs. per set of 4. The top plate (1/2" thick at stresspoints) and king bolt (1" diameter) are one single piece of SAE 1045 steel. Genuine Hyatt roller wheel I Sizes, 5" to 12" bearing. wheel. Heavy Duty Model car-ries 3 - 4 tons.



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er Hooks are made of listigue-resisting steel wire. When properly imbedded with a Clipper Lacer, they give remarkably long service.

Clipper LUBRIHIDE Pins have BUILT - IN lubrication. Friction is eliminated. Pins resist grooving. Hooks last longer. Users have found that belt joints continue in service 2 to 4 times longer when Clipper Hooks and LUBRIHIDE Pins are used. Order from your mill supply jobber.

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Each hook is independent, assuring flexibility crosswise as well as lengthwise. Double staggered points prevent damage to belt.



Magnaflux Method Being Used to Detect Flaws in the Surface of the Forged Upset Tool Joint of a J & L Integral-Joint Drill Pipe for Oil-Field Work

has to be shut down down due to failure of the mechanical equipment. Savings will also accrue due to the dependability of the equipment and the absence of need for expensive repairs.



Flame-Hardening Large Surfaces

SINCE the development of surface hardening by the oxyacetylene process, the number of applications

of this process has advanced into hundreds. Illustrated here is an usual example of the use that is ing made of the process for such hardening, and presents what is purably the largest flame hardening of eration thus far completed.



Barber-Colman Hobs Produce!

MO Pieces Per Grind \$8,500 Pieces Total Hob Life LUS Extra Accuracy and Fine Finish *OBBING SPIRAL GEARS FOR SKILSAW TOOLS

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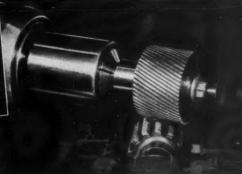
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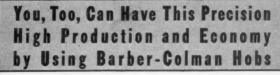
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Many production men have found that Barber-Colman Complete Hobbing Service has helped them to improve their product, and lower manufacturing costs.

This job at Skilsaw, where only the best is good enough. is a typical example. Four spiral gears are hobbed at one time in 20 minutes floor-to-floor. Barber-Colman ground hobs are used, and the job is done on a Barber-Colman No. 3 Hobbing Machine. Hob life averages 900 pieces per grind for 65 sharpenings, or 58,500 pieces total.

If you are not getting the accuracy and finish you desire, or think your hob cost is too high—try Barber-Colman hobs. If your problem is difficult or unusual, ask for a Barber-Colman field engineer to call. He'll be glad to help you.



Name of Part - Skilsaw Drill Spindle Gear. Material - 1315 S.A.E. steel.

Operation — Hobbing Helical gears, 30 pitch, 59 teeth, 2.162° autside dia., 3½° face; 2.096° pitch dia., 2.019° root dia., 14½° pressure angle; 21°2′ helix angle; four gears per load.

Hobbing Machine — Barber-Colman No. 3.

Hob Used Machine — Barber-Colman (lass A Ground Hob, 11½" long, single thread, 13 gashes. Cutting Method — One cut, conventional. Hob Speed — 309 r.p.m.

Hob Feed - 0.019' per rev. of work. Production Time — 20 minutes per load of 4 gears, floor-to-floor, 12 gears per hour.

Number of Settings — 4.
Pieces per Grind — 900.
Hob Life — 65 sharpenings, or 58,500 gears.



Individual metal containers protect your B-C hobs in ship-ment and storage. Blue boxes signify ground hobs, and green boxes unground hobs. Specifications are clearly marked on each box, simplifying the finding of the desired hob in your storage rack.

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reduction drives require

exceptionally strong,

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morthe extensive line of motor-driven n and drills built by Skilsaw, Inc., iago, Illinois, are cut with B-C Hobs Hobbing Machines. These speed

gears.

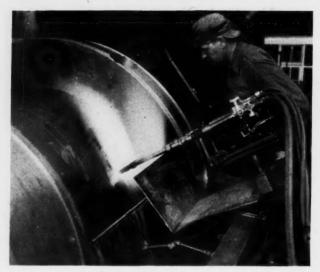
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Catalog K - Covering B-C Extensive Line of Hobs, Cutters, Reamers.

Barber-Colman Company

General Offices and Plant 207 Loomis St., Rockford, Illinois, U. S. A.



Illustrated Here is Operation of Flam Hardening the Surjoin a Lathe Spindt, Inches in Diameter, Give It the Necess Wear-Resisting Quin While Leaving the Surface in the Organ Tough, Unharden

Tough, Unhardened Condition (Photo Courtery Westinglo-Elec. & Mig. Co.)

In this instance a set of Airco acetylene welding equipment is being used to "flame-harden" the surface of a carbon steel lathe spindle that

is 63 in. in diameter. The surface in hardened to a dept that will give it

the necessary wear-resisting quaties, while leaving the metal below the surface in the unhardened, tou condition which best resists show

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YANKEE" VISE No. 993 CONVERTED NTO DRILLING AND TAPPING JIG

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in holds work square on face plate
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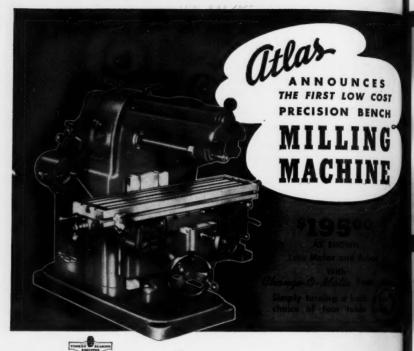
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right, made in four sizes: No. 991; 1½" jaw width. No. 992; 2" jaw width. No. 993; 2\" jaw width. No. 994; 4" jaw width. 'Yankee' Vise also available with removable swivel base. Sizes: Nos. 1991, 1992, 1993 and 1994.

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CONDENSED SPECIFICATIONS TABLE Working Surface .41/2" x 18" Longitudinal Travel Hand With "Change-O-Matic" ...10" Feed Range ("Change-O-Matic")....162" to 9.125" per minute Cross Travel......31/2" Vertical Travel......6" SPINDLE AND ARBOR Timken Tapered Roller Bearings 12 Speeds 54 to 3225 RPM Spindle Taper, No. 2 Morse Hole through Spindle.. Motor Recommended Feed200 lbs.

On paper for years—in tooling for the past to years—we've now completed development of its new Atlas Milling Machine to help meet the west machine tool needs of the nation.

It's a remarkable miller—ruggedly built, accurate efficient—just the machine to cut costs on all types of small milling jobs in tool room or shop.

Three types of table controls are available: standard screw feed, rapid-production lever feed, and the ser Atlas "Change-O-Matic" for instant selection of submatic table feeds, priced respectively at \$175, \$18 \$195, less motor and arbor.

Timken tapered roller bearings carry spindle but with a minimum of friction. An unusually wide rapper of spindle speeds provide correct surface speeds in all types of work and cutters. Swivel vise, rotary table, indexing centers, and safety belt guards are available.

Ask your machine tool dealer for complete infernation and send the coupon to reserve your 1941 Alas Catalog.

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Here's the machine that will push those small shaping jobs through in a hurry at low cost. Handles with speed and precision everything from ½" to 7" stoke. Crank type ram-driving mechanism; complete V-beit drive; 4 speeds; 5 automatic cross feeds. Operates from ½ HP motor. Price \$245 less motor.



Instantly reversible power cross feed, complete V-belt drive, precision ground bed ways, custom-bored spindle bearings, backgeared power—these and many modern features of Atlas F-Series Lathes are cutting costs and speeding up production in thousands of tool rooms and shops. Price \$93.75 and up. Available with Timken tapered roller bearings.

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New 2-, 3-, and 4-spindle models speed up continuous production work. Prices \$17.25 to \$342



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Atlas makes 22 models of mechanical and hydraulic Arbor Presses for pressures from ½ to 70 tons. Shown here is the 12-ton compound leverage press.

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Mobilization of Community Industrial Resources

By W. H. SHANK

IN order that their city may be in position to render the maximum of service in the defense program, co-ordination of the community's industrial resources so that the machine shops of the community comprise, in effect, one huge machine shop, has been accomplished by the manufacturers of York, Pa.

Mobilization of the community's mechanical equipment was brought about after one of the manufacturing plants in York had been offered a contract to manufacture ordnance materials and found that the plant was insufficiently equipped to handle the job. At the suggestion of William S. Shipley, Chairman of the Board of the York Ice Machinery Corporation. every manufacturer in the York area who had machine tool equipment in his plant submitted an inventory of his equipment to the directors of the York Manufacturers' Association. From these inventories a retabulation was made which shows at once the number, sizes, and capacities of all machine tools and other metal-workink equipment available.

Not only were the manufacturing plants included in the inventory, but garages, jobbing and tool shops, welding shops, and other industries having maintenance shops were included as well. It is not planned to move any equipment, but rather to take the work to the machines wherever they happen to be located.

The plan of operation is very ple. When a contract to manufacts defense equipment is offered to York Manufacturer's Association one of its members, the contract analyzed to determine the kind a amount of equipment required to a plete the order and then, by referr to the inventory, the association tell at once whether or not the tract can be handled. If the a munity equipment is sufficient contract is accepted and the job divided among the plants and sho in the community, the parts-jo being allotted to the shops best equi ped to handle them.

Here is a plan by which the community is enabled to take an actipart in defense preparations, the greenment has the benefit of industrices which otherwise would ineffective, and the manufactures the community are enabled to accept the community would be lost to them. The proculd be used in every industrial community in the country, particular where there are several metal-manufacturing plants employing a variety of equipment.

Officers of the York Manufacture Association defense program commit tee who are responsible for the operation of the community business plants. Chairman, William S. Shiple Chairman of the Board, York is Machinery Corporation; committee 56 10

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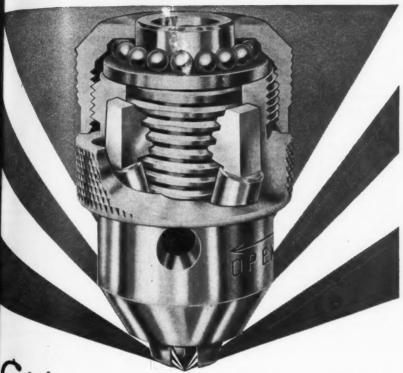
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CO DRILL CHUCKS

EYLESS—No key is needed, otherwishough holes are provided for a The plantaight pin for universal use.

articular HAND OPERATED — Drill is a variet paced by hand only. It tightens and centers itself by action of drilling.

SELF-TIGHTENING - A coneshaped screw directly actuates three gripping jaws. Jaws are keyed in body - screw does not take jaw torsional strain - it only moves them up and down. This is the reason for the 20 years' successful use of Ettco Chucks.

Write for complete details.

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Also CHICAGO and DETROIT

men, W. J. Fisher, vice president and general manager, A. B. Farquhar Company; R. P. Turner, vice president, New York Wire Cloth Company; Warren C. Bulette, president, Brandt-Warner Manufacturing Company; secretary, Robert E. Gephart, secretary and treasurer, York Manufacturers' Association.

W & S Dies, Tools and Special Machinery are the subject of a 36-page catalog designated as the No. 40 which is now being distributed by S. B. Whistler & Sons, Inc., 752-756 Military Rd., Buffalo, N. Y. The catalog includes line drawings and data on grouped hole dies, oval punches and die bushings, perforating die assemblies, round punches and die bushings, templates, hardened forming die steels, universal standard notching dies, various shapes of notches cut on a Whistler Universal Perforating Dies. Whistler Universal Perforating Dies. Whistler Drawn and Embossed Stamping Dies, Automatic Con-

trol Equipment, Single and Multip Stampings, Stamping Applications, a Universal Perforating Dies are prese ed by means of photographs and a scriptions.

In addition, Catalog No. 40 conversion table of various hard numerals, information on enginee and design services, an information of the conversion of the c

Auburn Ball Bearing Catalog %. The Auburn Ball Bearing Co., 28 Intrial St., Rochester, N. Y., is now plishing a 24-page illustrated can containing engineering data on its or plete line of ball bearings. Discussin turn in the catalog are bearing sign and manufacture, bearing a radial ball bearings, double thrust bearings, special ball thrust bear Auburn installations and applications selecting bearings, factors for safe balls for every use, and washers, distraces, and rings. Copy of Catalog 1 11 free upon request.

1500 (average) rigid joints per hou 3200 (maximum)



This is a $\frac{1}{4}$ " dia. rivet joint section showing the preferred type of joint accomplished on the RIVITOR.

Handled on the RIVITOR, your meeting job's approach to this man mum is governed by the ease which the work can be handled.

Exactly how a preferred type of a rivet joint is accomplished at these is shown in our new RIVITOR Bulk R-4, in addition to complete specitions of standard type RIVITORS. Your copy will be sent promptly.

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"Machinist's Practical Guide," a handy vest-pocket book contains 55 pages of helpful information on Drill Grinding, Cutting Speeds, Decimal Equivalents, Lubricants, etc. Sent free. Please give name, and firm by whom you are employed.



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MODERN MACHINE SHOP

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Transferring Die Hole Centers to Punch Plates and Shedders

By WM. C. BETZ

ON a special piercing operation we were having a lot of trouble with broken punches, due to misalignment of the punches with the die slots. The behavior of the tools was erratic; sometimes as many as 10,000 blanks would be produced without breaking

the tools as follows.

We made a button die, as shown in Fig. 1, which we ground inside an out so that the bore would be perfectly concentric with the peripher then we ground one of the punches of that it would be a sliding fit in the sould be so

a punch, and again we would get in a few hundred or less. After givin

the job a bit of study we correct

bore of the button die and made the rectangular end a snug fit in the ski in the work die. We next doweled the new punch holder to the die piece so that we could be remove this holder from

the die after each hole

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the holder had been drille and bored.

The shanks of the piering punches were growto 0.1875 in. diameter at the rectangle was growto read 0.054 x 0.104 is cross section for state that were 0.050 x 0.100 is cross section. To grit these punch ends constructive with the shanks made and used the fixtuillustrated in Fig. 3.

To make the tool show in Fig. 3 we bored block of steel exact 0.1876 in. and mount the block on an accural ly-ground arbor so the

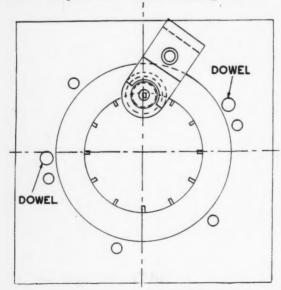
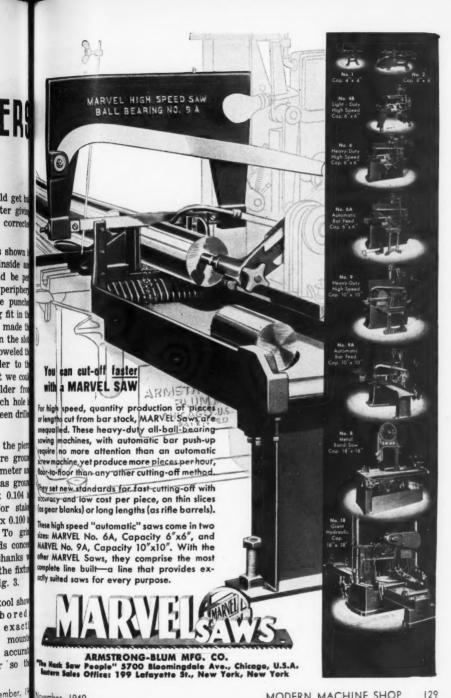


Fig. 1—Drawing Illustrating Method of Accurately Transferring Die Hole Centers to Punch Plates and Shedders



November, 1940

MODERN MACHINE SHOP

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the flats on opposite sides could be surface-ground to a dimension of exactly 0.050 in. from one pair of flats to the other.

To keep the punch ends concentric with the shanks, we ground all four sides on a surface grinder to one final setting of the wheel head. In other words, we took a cut on one side of the block and then flopped it over to the next side and ground it without adjusting the wheel spindle. This grinding of adjacent sides was repeated until the punch had been ground down to size on all dimensions, leaving the rectangular punch section absolutely concentric with the shanks of the punches.

We next mounted our die on the face plate of a lathe, after clamping the button with the special punch that fitted a die slot, trued up the button to a test indicator, and clamped the die securely in place on the face plate. We then removed the button and punch and slipped the punch holder over the die on the dowel pins, after which we clamped the holder to the die with a pair of low accurate parallels between them and drilled and bored a hole of 0.1876 in. diameter in the holder.

We then slipped a finished punch into the holder and pushed the rect-

angular piercing end into the dia and it fitted perfectly. We proceed with the rest of the holes in

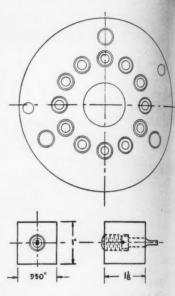


Fig. 3—Steel Block Used to Grind Punch Ends Concentric with the Shanks

the holder from the die, truing we the next consecutive hole in the die with the button and special punch

the punch holder which was accurately located by the dowels, and then drilling and boring the holes to size

When the holder was finished we inserted a whole set of finished punches into it. They fitted perfectly, and lined up with the die openings.

The procedure described here assures a perfect fit, and the method can be adapted to fit the case.

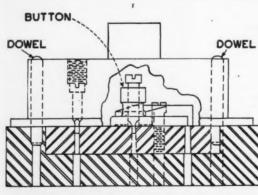


Fig. 2-Plan View of Punch Holder

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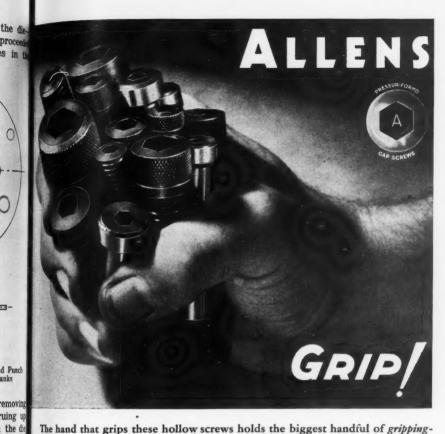
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The hand that grips these hollow screws holds the biggest handful of gripping-er so far available to engineers. This HOLD-ability of ALLEN screws increases with Allen advances in two directions: -

(1) Through improved methods of cold-drawing and "pressur-forming", the screws are given more and more strength for tremendously tight set-ups.

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By virtue of these threading developments, ALL of the thread-surfaces engage the tapped hole, with evenly distributed friction-pressure over the entire length

80, "Allens" keep their HOLD on assembled parts — as also on the friendly allegiance design and maintenance engineers.

Call your local Allen Distributor for prompt, accommodating service.

ber, 1940 November, 1940

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MODERN MACHINE SHOP

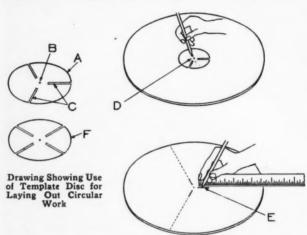
Celluloid Template for Laying Out Circular Work

By W. H. CARWAY

TLLUSTRATED in the drawing is a celluloid template designed to facilitate the laying out of circular tor, a number of equally spaced slot radiating from near the center poin B are laid off and cut, as shown at The slots are made just wide enough to take a pencil or scriber point

To use, the disc is placed so the its center point hole is directly on the center of the work to be laid off, an

a mark is made alon each slot, as shown D. These marks made long enough that when the ten plate is removed ruler or straight ede can be laid along ea mark and the mai continued to the ed of the work, as show at E. In this man ner, the work i quickly and accurate ly divided. Other ten plates can be u having different i visions as indicate at F.



work made from paper, cloth, sheet metal, wood, and so on. The template is cut from an old piece of carefully cleaned photo film in the shape of a circular disc as shown at A, the diameter of the disc being approximately three inches. A center point hole, B, is then made in the disc and, with the aid of a divider or protrac-

Washer Welded on Chise **Protects Fingers**

By A. H. WAYCHOFF

TLLUSTRATED in the drawing is chisel designed to protect finger from misdirected hammer blows.

HIGH SPEED STEEL



THESE FEATURES AT

- No honing.
- Will not chatter. · Chrome-like finish.
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- · Extension pilots for line-up work.
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Only CM "Inswell" chain is made by the patented "Inswell" electric weld process that puts 25% extra metal at the critical point of each link... at the weld. Then too, the CM "Inswell" welds are at the side, with the extra swell inside—out of the way—not at the ends where each adjoining link can gouge and wear into the welds.

Every link of "Inswell" electric welded steel chain is uniform in strength, size, durability and elastic limit... is carefully tested to well beyond safe working loads. For extra safety to men and materials... for serviceability and long wear... and, for cost-cutting performance, specify CM "Inswell" weld steel chain. See your mill supply distributor for full details, or write for descriptive bulletin.

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Engineering Company Frankenmuth, Mich.

heavy washer is simply welded about one inch from the end of the chis as shown. Then, should a blow be

misdirected with a hammer, the hammer would strike the washer above the fingers and thus save them from being cut or bruised.

This is but one example of the use that can be made of heavy washers and a welding torch to provide serviceable guards on chisels, punches, drifts, and other hand tools.



Illustration of Guar Designed to Proto Fingers from Rus mer Blows.

Worn Draft Machine Head and Scales

By JOHN E. HYLER

THE modern drafting machine scale while it is given an anodic coaling to make it more durable than it were of ordinary light metal, is subject to wear, especially in case where drawings are being made to many different scales, necessitating the continual mounting and dismouting of scales in the machine head. A scale upon which the engaging lug has become worn somewhat of the contacting points at the edge will easily work loose in the machine head and cause trouble.

Through the use of the little trid described here, a scale that is quit loose can be firmly mounted in the head, nothing more elaborate than every tiny piece of Scotch tape being required. Take a piece of Scotch tap

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for Sheet Metal



Most of the sheet metal, ferrous or non-ferrous, wherein hardness is important, whether for automobile fenders and bodies, telephone apparatus, loose-leaf binders, clocks, dental material and innumerable other purposes, is having its hardness determinations made on the "Superficial."

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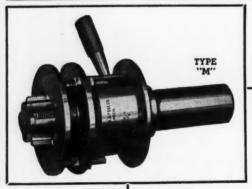
about an inch long, and press it down flat on the edge of the drafting table. It will stay put there, of course, and if placed along the upper edge of the of the table where it is out of the way, may be left there for periodic service. With a sharp knife, cut a tiny strip from the edge of the piece so that you have a piece of tape about $\frac{1}{16}$ inch wide and an inch long.

This tiny strip of tape is stuck to the edge of one of the contact points on the scale lug mentioned. If you examine the scale carefully, you will find that it makes three-point contact in the machine head, there being two engaging points on one side of the lug, and one point on the other. The tiny bit of tape is applied along the beveled edge of the single contact point. This increases the effective width of the lug by the thickness of the tape, which you will find is just sufficient to make it fit

snugly into the machine head and thus eliminate all trouble due to loue ness or play in the joint.

Morse Bulletin R-40. A comprehense catalog, engineering data book and prolist on Morse Roller Chain has been prepared for distribution by the Morse Chain Co., Ithaca, N. Y. The book which is designated as Bulletin R-4 contains complete information on the construction of channel-lubricated, between the construction of channel-lubricated, between the construction and applications; but how to select the right chain for a drive, and includes performance and engineering information. In addition Bulletin R-40 features illustrations are specifications of regular and specifications for their proper use. The complete price list for chains and sprockets is also included.

Engineers, plant operating men, and purchasing agents will find the bulleth especially helpful and can obtain a copy free by addressing a request on their company letterhead.



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On The New SILVER STREAK INSULATED GRINDING DISCS



Special aluminum oxide grit - capable of 25% more work. Exclusive bond that won't soften under high heat. Toughest backing you ever saw. That's the new Silver Streak Insulated Grinding Disc - and we're so sure it will boost your finishing time and cut your finishing costs that we're prepared to back our claims - with this generous Free Trial offer.

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Make us prove it! You have absolutely nothing to lose - and probably a lot to gain as grinding speed steps up - finishing costs and disc costs go down. In one test, this new disc completed 72 units of work on which an ordinary disc was "all through" at 17 units! Write for the Free Trial today telling the size and grit you want! Abrasive Products, Inc., 507 Pearl St., South Braintree, Mass.

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MODERN MACHINE SHOP

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Get Together

N another page in this issue is a short article telling how the industrialists of a medium-size American city pooled their equipment and resources in order to be able to take an effective part in the government's defense program. A huge plant such as an automobile factory may not need the help of neighboring manufacturers, and one large plant in a community where there are no others may not be able to obtain sufficient co-operation, but any community that is fortunate enough to have several plants is in position to follow the York plan of inventorying all of the equipment of the community so that it can be mobilized to handle contracts which would be impossible of accomplishment by any single plant.

The government is already in possession of a complete inventory of the manufacturing facilities of the United States, and if we find war unavoidable it is likely that the government will do the very thing that the York Manufacturers' Association has done—allot raw materials to the shops best equipped to process them—but we can assist our own communities and our government by mobilizing our community resources and preparing to take an active part in the defense program before pressure becomes necessary.

Plan Systematically

As a small shop "grows up," a lathe is added here and a milling machine there, one machine is moved over to make room for another, an

extra shed is built for rough stop so that a couple more machines on be set in, occasionally a lineshaft shifted to make room for anothe machine line, and eventually the shifted itself classed as a manufacturing plant.

In these days and the days just ahead a great deal of shifting will h done in order to realign the show and small plants to meet the need of increased production. Plants work ing on government orders will h working at top speeds for months to come, and plants that have no government orders will find themselve taxed to take care of the domestic market needs. In either case, intelligent planning for plant efficiency will eliminate lost motion, increase production, reduce operating costs, and hold the amount of labor required at the minimum-particularly non-productive labor.

In a large plant where a change of products or of models is to be made months are spent in planning the setting of the machines so that when the actual change is made, each machine, bench, or other piece of equipment can be moved into the exact position it is to occupy with out loss of time in shifting the machines about from one position to another. This is done by making a floor plan on heavy paper, working to a definite scale such as, perhaps one-half inch to the foot, and then making plan cut-outs of the various machines and benches, indicating the floor space required for each machin and made to the same scale as floor plan.

With such a floor plan and the cut-outs, the plant manager has, a effect, a miniature shop in which he can move the equipment about by the simple process of pulling out a thumbtack and moving the cut-out with his finger—and that is much easier that shifting heavy machine tools and benches. Any small plant manage who has not as yet adopted the layout method of planning his shop will do well to look into it.

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The accompanying photographs suggest the amazing flexibility of the Dizor Floating Lamp by illustrating a few of the countless positions obtainable. It may be raised, lowered, pushed, pulled, swung completely around by a mere finger's touch — and stays rigid at the exact angle placed, WITHOUT ADJUSTMENT OR LOCKING, the arms being scientifically counter-balanced by a spring.

Dazor Floating Lamps mean correct localized lighting, with no glare, no eyestrain. They soon pay for themselves in greater efficiency.

Five types of bases available for clamping or screwing to lathes, drills, presses, shapers, milling machines, benches, drafting boards, desks, walls, business-machine stands. Also portable pedestal type.

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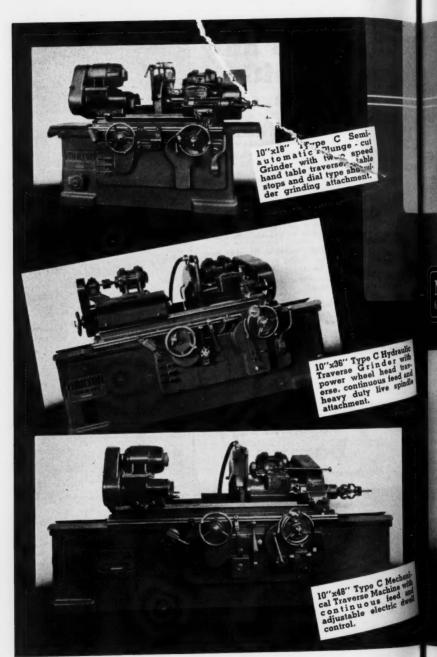
> Dazor Floating Lamps

Fluorescent and Incandescent









Diversified Arrangements to Meet Your Grinding Problems . . .

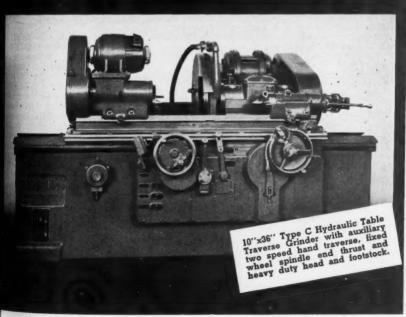
THE NORTON 10" TYPE C

No matter if your cylindrical grinding job is a plunge cut or traverse operation Norton 10" Type C's can handle it. For some operations the highly productive semi-automatic with rapid hydraulic approach of the wheel and finely adjustable feed best meets the requirements. Other jobs will need power table traverse—either mechanical or hydraulic as preferred—while in some shops a machine with both semi-automatic features and hydraulic table traverse makes a more universal arrangement for plunge cut and traverse operations. All or any of these arrangements are available to you.

Send for new bulletin No. 2288 illustrating and describing Norton 10" Type C.'s.

Norton Company • Worcester, Mass. M-427







Hanchett "Rotary Plano" Grinder

The Hanchett Manufacturing Company, Big Rapids, Mich., has developed a large surface grinder designated as the "Rotary Plano" Grinder. grinding member, driven by a 30 h.p., 1,200 r.p.m. motor, is mounted on a cross rail between two columns. This rugged counterbalanced rail has power elevation provided by a 5 h.p. motor and is automatically clamped to both

the main and auxiliary columns.

The grinding wheel head has hand and automatic down feed, and adjustable cross feed with a range of speeds of from 3 to 9 in. per minute driven by a four-speed, ¾ h.p. motor. The ways on which the wheel head travels are tiltable to an angle of 5 deg. in either direction. The machine can be fitted with a straight wheel on a horizontal

spindle, or a cylinder or segment wheel on a vertical spindle. In a sainst I combination the wheel head can be the

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hand or automatically fed in increment of from 0.0002 to 0.003 inch.

The 72 or 84-in. table is driven by 15 h.p. motor through a variable special to 15 h

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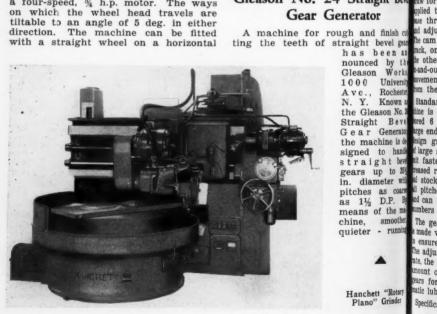
Ave., Rocheste rom the N. Y. Known a the Gleason No. 2 hine is Straight Beve bred 6 Gear Generator the machine is & lesign graded to handle large straight beve hit fast gears up to 35 reased rin. diameter will al stock priches a coaral la liftch Ave., Rochester pitches as coars ll pitch as 11/2 D.P. B means of the ma smoother The ge chine. quieter - runnin

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November



Hanchett "Rotary Plano" Grinder

November, 191

raight bevel gears of the larger sizes re said to be cut in a minimum of

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The principle of generating is that of relative rolling motion between the ecorocating tools and the gear blank.
New type of tool-relieving mechanism di tool slide on the No. 24 generator

wide rigid tool suprt and permit high roke speeds. To reice wear, the tool ide ways are contructed of cast iron gainst hardened steel. The fully enclosed radle is mounted on nti-friction bearings segment e. in an id can h increment riven by a a rigid, well-proiable spectroned housing a
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Gleason
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Works had-out movement provides rapid
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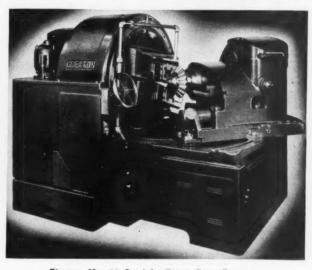
Rochest and the chucking posterior.

Known a Standardly arranged, the No. 24 maton No. 2 the is equipped with a work spindle
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Generatin arge end with % in. taper per ft. This
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o hand dlarge shank work and is said to perht bewell faster cutting because of the into 55 reased rigidity. A new type of univerter with a stock dividing gage accommodates
us coars a pitches within the machine range
D.P. 5 und can be used for either even or odd
the machine range of teeth.

The gearing of the No. 24 generator made with greatly improved accuracy be ensure more accurate tooth profile. The adjustments of the feed and speed ale, the index, the ratio of roll, and the mount of roll are obtained by change gars for fast and easy setup. Automatic lubrication is provided.

Specifications of the Gleason No. 24

Straight Bevel Gear Generator are as follows: cone distance, maximum, 17% in.; pitch angle, maximum, 84 deg. 18 min., minimum, 5 deg. 42 min.; ratios, from 1 to 1 to 10 to 1; pitch diameter, maximum, 10 to 1 ratio, 35½ in., 2 to 1 ratio, 31% in., 1 to 1 ratio, 25 in.; diametral pitch, coarsest, 1½; face width,



Gleason No. 24 Straight Bevel Gear Generator

maximum, 6 in.; index range, 10 to 200 teeth; floor space, 74 x 105 inches.

Haffling Sensitive Production Tapper

To meet the needs of manufacturers of electric shavers, clocks, and other intricate mechanisms involving difficult tapping operations, Marburg Brothers, Inc., 90 West St., New York, N. Y., is now marketing the Haffling Sensitive Production Tapper shown in the illustration herewith.

According to the manufacturer, the principal feature of the machine is found in the super-sensitive friction which can be set between the driving and driven clutch to such a degree that the tap will instantly stop whenever any predetermined tension between tap and work is reached. The operator merely raises the table by a hand or foot

"Rotary

Grinder



Haffling Sensitive Production Tapper

lever until the tap has commenced tapping. When the predetermined tension between the tap and work is reached,

the tap is said to stop automatically. Lowering the table engages the opposite clutch and withdraws the tap from the work. In this manner, either human element or some mechanical means of stopping the tap is said to be eliminated, a feature which is of particular advantage when tap-ping plastics or other delicate parts that might be easily broken should the tap strike bottom. Conversely, breakage of taps is said to be equally eliminated for the same reason when tapping metal parts. By means of a simple ad-

justment, the Haffling Sensitive Production Tapper can be changed into a power screw driver, retaining, however, all its safety features. The tapper is supplicated with reversible motor which when in operation, runs continuous double clutch, tension spring, verti spindle, and chuck for tap. Standa equipment also includes feed table w hand and foot lever, either one of wh can be readily disengaged.

"Hisey" 5 and 71/2 H.P. Pedestal Type Grinders

"Hisey" 5 and 7½ H.P. Pedestal In Grinders in 18 and 20-in. wheel sizes a now being marketed by The His Wolf Machine Co., Cincinnati, Ohi The motors of the grinders are total enclosed and ventilated through the large pedestal. A continuous circulate of air passes through the motor and out of one motor foot into the pedestal. and then into the other motor foot a through the motor again.

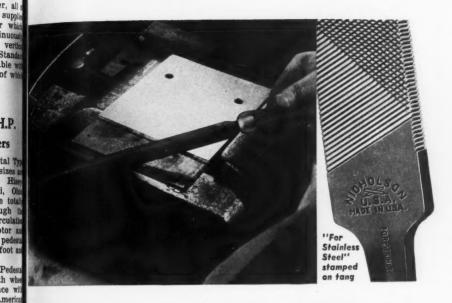
The Hisey 5 and 71/2 H.P. Pedest Type Grinders are supplied with wh guards which are in accordance with the standards adopted by the America Foundrymen's Association. Accordi to the manufacturer, the guards are de signed so that workpieces cannot become jammed between them and the grind ing wheels, and extend far beyond the



"Hisey" Pedestal Type Grinder

November, 19 November

To co



COOTAIN MASTERING ONE OF INDUSTRY'S TOUGHEST STEELS

rond the Every advance in metallurgy opens up avenues for new products, or new standards in old ones. But with it come also new problems of production. Stainless steel, for instance. Difficult to machine, much of the burden of fabricating is thrown onto hand-filing. Even so, stainless steel is usually much too tough for generalpurpose files.

> To combat the abrasive action of stainless steel's hard chromium carbides and nickel alloy, Nicholson's % years' experience in file making exclusively has produced for Industry a file with teeth-cut and wearing

qualities unlike those of any other file. File efficiency is greater, and file costs are lower.

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NICHOLSON FILE CO., PROVIDENCE, R. I., U. S. A. (Also Canadian Plant, Port Hope, Ont.)

FOR EVERY NICHOLSON FILES

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THEMACE

TYPE J-15
PRECISION GRINDER
SPEEDS UP TO 50,000 R.P.M.

With Special Bracket for Adapting to Surface Grinders



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Complete new catalog Just off the Press

THE McGONEGAL MANUFACTURING CO.

JONES BUILDING EAST RUTHERFORD, N. J.

periphery of the wheels so that sparks and chips are arrested. A flar on the outlet of the guards enable them to be easily connected to a ducollecting system.

Dension Type DLAC2 Hydraulic Press

A recent addition to the line of sm capacity hydraulic presses marketed The Denison Engineering Co., Colubus, Ohio, is the Type DLAC2



Denison Type DLAC2 Hydraulic Pres

shown herewith. The press is availated in 5, 15, 25, or 50-ton capacity and furnished for either manual or electrical operation. It is completely self-or tained and is said to require a minimof floor space. For safety and speance, all corners and edges have been rounded and careful attention has a given to the location of operating of trols. Toe space for the operator is been provided beneath the frame the front.

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WHERE "GOOD ENOUGH" WON'T DO

There are no "unimportant" parts in an airplane engine. Efficiency and dependability demand perfect performance all along the line. Consequently the only standard for selecting materials should be ability to meet the requirements.

Nickel-Chromium-Molybdenum and Nickel-Molybdenum oil hardening steels are being chosen for many engine parts such as crank shafts, pins and accessory gears because of their demonstrated capacity for doing their jobs. Not only do they develop the necessary strength and

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toughness, but also the requisite hardness, and they machine in the fully heat treated condition.

Thus they give the engine manufacturer confidence in the performance of the parts and help keep his production costs within reasonable limits.

Complete technical data about the various Molybdenum steels will be found in our book, "Molybdenum in Steel". This book will be sent free on request to executives and production heads.

MODUCERS OF MOLYBDENUM BRIQUETTES, FERRO-MOLYBDENUM, AND CALCIUM MOLYBDATE

Climax Mo-lybidon um Company 500 Fifth Avenue New York City DLAC2 press is as follows: Control valve with operating mechanism, motor, and pump are in the center section of the press, ram and cylinder assembly is located in the upper part of the "C" frame, and oil reservoir is positioned in the base. The cylinder assembly consists of an accurately finished steel cylinder with nickel alloy iron cylinder head and mounting flange. The upper head is welded into place, thereby eliminating joints and possibility of leakage. The lower head has a large bronze guide and a self-sealing gland packing. The ram is of ground and polished steel and is fitted with a guide head which operates in a ram guide in the throat of the press and which prevents the ram from rotating. Pump is of the constant volume hydraulic vane type and is mounted vertically with the motor in the column directly above the oil reservoir.

The control valve of the Denison Type DLAC2 Hydraulic Press is of the subplate or panel mounting type which may be removed for maintenance or replacement by removing bolts and without breaking pipe connections. The valve is operated mechanically on the manual press and by solenoids on the electric

press. Direct control of either the mully or electrically operated press derived through a shipper rod whit is supported in four bearings and protected by being mounted behind in ram guide in the throat of the pre "Up" and "down" stroke is adjust by means of adjustable stroke-stops the shipper rod.

A hand lever fitted with a convenience ball grip or a foot-operated pedal available with the press for operation. The pressure gage of the press is the flush mounted type and is gradated both in pounds per square inchest tonnage to facilitate setup for difference operations. To protect it against we the gage is fitted with a shut-off or Sub-bolster of the press is machine drilled, and tapped for a standard in ster.

To operate, the control of the Ty DLAC2 press is pushed down, there causing the ram to descend until either contacts the work or reaches ilmit of the downstroke. If it contacts the work before the lower stroke in is reached, the press will continue exert tonnage against the work us the controls are released. When the m returns to the limit of the upstroke



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CLEVELAND - OHIO

stops, the pressure is released, and the pump and motor run idle. Tonnage exerted by the press from the maximum rating to approximately 10 per cent of the maximum can be accurately adjusted by means of a tonnage adjustment located behind a convenient access panel in the rear of the press.

Madison-Kipp Giant Kippcaster Model No. 500

The Madison-Kipp Corp., 208 Waubesa St., Madison, Wis., is announcing a newly designed die machine for zinc alloy. In order to differentiate it from the Standard Kippcaster which the company has long been producing, the machine is to be known as the Giant Kippcaster Model No. 500. The Giant Kippcaster is, in general terms, about twice as large as the Standard unit. The Giant is, The weight of the is, however, more

than four times that of the Standard to provide the added strength needed for handling substantially larger parts than can be cast in the Standard Kippcaster.

Whereas the Standard Kippcaster is fully pneumatic, the Giant Kippcaster utilizes a combination of hydraulics and air. The die head ram is operated hydraulically through a special toggle arrangement which is actuated by a hydraulic cylinder. The standard hydraulic

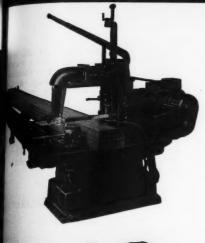


Madison-Kipp Giant Kippcaster Model No. 500

system is the Vickers combination purmounted on a 1½ h.p., 1,200 r.p.m. in tor. The standard die head is 8 x 10 in but clearance is provided so that larg dies can be handled. Both the stationary and the movable dies may be two standard thicknesses, either 3 or inches.

The stroke of the machine is 8% in and when a standard air cylinder of in. is provided with a standard maplunger of 1% in. 1,836 lb. of pressure.







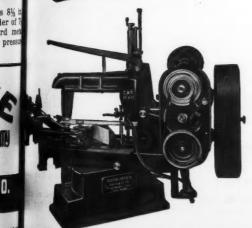
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"Saw More" **HEAVY DUTY—HIGH SPEED METAL CUTTING MACHINES**

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swivel on base to 45 degree for angle cutting.

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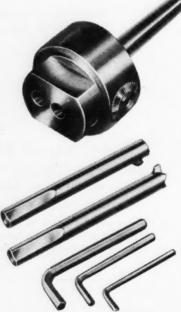
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OFFSET BORING HEADS



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GLENDALE, CALIFORNIA, U. S. A.

is exerted on the metal at 100 lb, pressure. The gooseneck with stand plunger has a capacity for shooting 3½-lb. casting in zinc alloy, and pot capacity in zinc is 200 pounds.

The Madison-Kipp Giant Kippea Model 500 is 8 ft. 1 in. long, 3 ft. 8 wide, 6 ft. 2 in. high, and weighs is lb. The main castings of the unit well as the metal pot and gooms are made of high strength Meehank iron. The power parts are made heavy cast steel.

Carboloy Chip-Breaker Grinder

To meet the chip-breaking proloccasioned by the rapidly spreading a of cemented carbides for steel cuts Carboloy Co., Inc., 11143 E. 8 Mile M



Carboloy Chip-Breaker Grinder

Detroit, Mich., has developed a mail for use in grinding chip-breaker carbide tools, to be known as the 0 boloy Chip-Breaker Grinder.

With the grinder, exact forms of dibreakers determined as ideal for

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given operation are said to be quickly duplicated when a tool is reground. For this purpose, the tool is clamped in a toolholder mounted on a universally adjustable fixture table fitted with three protractors to permit adjusting to correct setting in all directions. The tool is then moved under the grinding wheel to a distance corresponding to the chipbreaker width desired and the wheel is fed down while feeding the table back and forth. The wheel feed is provided with graduations so that chip-breakers can be ground to the exact depth desired.

Resinoid diamond wheels of 100 grit are recommended for use on the chipbreaker grinder. Coolants recommended in order of efficiency in keeping the wheel open include Stadoil, water with just enough soluble oil added to pre-

vent rusting, and keosene.

The Carboloy Chip-Breaker Grinder is designed for use with tools up to 1½ in. wide. Operation is through a 110-volt 60 cycle single dustproof ball bearing a.c. motor equipped with a reversing switch. The motor is rated at ¼ h.p. at 3.450 r.p.m. Special motors for 220-volt and 25 or 50 cycle current are available on order.

Special Units and Accessories Barber-Colman No. 3 Hobbing Machines

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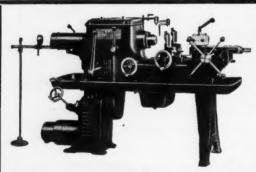
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Special units and accessories are being offered for the No. 3 standard precision hobbing machines mand tured by the Barber-Colman Ca. Loomis St., Rockford, Ill. The Barber-Colman No. 3 Hobbing Machine in two types; namely, the No. 3 sard and No. 3 precision. The points of difference between the machines are the extra large thread precision worm gear on the cision machine, and the extra limits of accuracy to which the van parts of this machine are held for purpose of producing highly accuracy. All new special units and are sories may be applied to either a chine.

Capacity of either machine is diameter with 7-in. face and 12 during litch in cast iron or steel machines are designed for general pose or production hobbing work precision machine is also adaptable fine toolroom work, and is said to he



Spindle, mounted on Timken Precision Tapered Roller Bearings. Levers within immediate reach of operator. Head cast solid with bed, insuring rigidity.

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The new SIMMONS No. 1 (11/4") Turret Screw Machine offered to you with three distinct advantages:

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The SIMMONS Micro-Speed Drive, equipped with published to control and magneto brake, offers a range of spied dle speeds up to 1,500 RM. The operator can select in speed best-suited by a management of a hand wheel.

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one just right for every job. Capacities: 3/16" to 7/8" in steel. Ask your Stanley distributor for demonstration. or write for literature. Stanley Electric Tool Division, The Stanley Works, New Britain, Connecticut.

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Barber-Colman No. 3 Standard Hobbing Machine

a guaranteed accuracy of not more than 0.0006 in. accumulative error between non-adjacent teeth on a 4-in. pitch circle.

According to the manufacturer, the application of special units and accessories increases the efficiency of the machines, or adapts them to special classes of work. For example, the application of vertical feed is said to be practically indispensable for cutting worms and worm gears. It is of exceptional advantage for cutting worms

which are "blind" at each In this case, the work is to the proper depth awhich the work spindle is turned to the original or signing position.

A horizontal cam feel provided for feeding the slide forward short distant after which the slide is turned rapidly to the star position. This feed is used such work as speedoms gears where the cut is always to the star of the star of

A handwheel-operated of makes possible a change of from one type of work to a other in a minimum of the High production hobbing we is facilitated by a lever one ated collet. A special h swivel is provided for work too high an angle for t standard swivel to accomm date, such as high angle he cal gears, worms, and thread Made without outboard su port to the hob spindle, it pe mits the hob to approach close as possible to the w spindle.

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A left-hand swivel is use for hobbing right-hand he cal gears which have lar

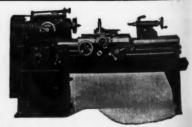
angles ranging between approximate 30 and 60 deg. A micrometer adjustment for the hob slide is available for making new hob settings. It is graduated dial tells the operator at glance the distance the slide is being moved. A one-shot oiling system is provided for manually lubricating all in portant bearings of the machine at on time.

The taper hob spindle is designed to obtain extra fine finish, greater acreacy, and longer hob life. It permits

—— "C & J" —— 15" and 16" Lathes

12 Speed Geared Head-Motor Drive Timken mounted spindle Modern Design ... Liberal Dimensions Write for bulletin

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HANNIFIN PNEUMATIC ARBOR PRESSES

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Hannifin Arbor Presses are designed for production operations and built for continuous heavy-duty performance and sustained high efficiency. Hannifin air cylinders have simple outside adjustment of the piston packing, allowing easy maintenance of efficient piston seal. The soft, graphite-treated piston packing may be easily replaced and, if necessary, ordinary graphited packing can be used for quick replacement. All Hannifin Cylinders are bored and then honed, producing a straight, round, perfectly smooth cylinder bore. Perfect piston fit in a highly finished cylinder bore means efficient operation, without leakage or waste of air power, and with minimum friction loss.

Hannifin Arbor Presses are built in 57 standard types, capacities 600 to 50,000 lbs., for assembling, broaching, molding, keyway cutting, oil grooving, straightening, bending, forming, and similar work. Also furnished with the Hannifin patented oil cylinder speed control.

HANNIFIN MANUFACTURING COMPANY,

621-631 South Kolmar Avenue Chicago, Illinois



Model B-2 Arbor Press, built in capacities from 1700 lbs. to 18,000 lbs. Many other types available, both bench and floor models. All have Alemite lubrication.

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Model No. 52 with the door of the steel cabinet removed, showing the motor, fan-housing and spark-resistant filter bags.

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Available in several sizes, ready to be piped to pedestal grinders, bench motors,

surface grinders, buffers, cutoff machines, etc., they gather dust and grindings and recirculate the purified air, so there is NO HEAT LOSS! The rear view sketch shows a TORIT Dust Collector connected to both wheels of a grinder-typical of many possible installations.



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Torit Manufacturing Co. 296 WALNUTST ST PAUL MINN

the hobs to be located on the spini with consistent accuracy. Runout en is said to average only 0.0001 to am inches.

A high speed hob swivel is available for fine pitch class of work and sm diameter work which usually requi-smaller diameter hobs than the mi mum size made for the standard % spindle. A variety of gear ratios a m.'s as follows: 533 (standard), 1,066, 1,200, 1,800.

Barber-Colman No. 3 Hobbing In chines are now provided with chromin plated handwheels, levers, and a gur over the work spindle drive-shaft.

Iefferson Endless Belt Sander

Designed to eliminate hand sandi and finishing, the Jefferson Endle Belt Sander shown in the illustration has been placed on the market by the Jefferson Machine Tool Co., Fourth Cutter and Sweeney Sts., Cincinnati



Jefferson Endless Belt Sander

Ohio. The sander is made for use will wood or metal and can be used on lara flat surfaces as well as concave, con vex or any irregular work.

The flexible belt responds quickly the operator's touch. The table trave on ball-bearing rollers and is easi moved to carry the work back and for while the operator applies pressure the flexible belt with a block or pas The belt travels at the proper level enable the operator to work in a name ral position without straining. overhead idlers run on high grade bi Both idlers are adjustable bearings. for aligning sand or emery belt, and o idler has an adjustable counterbalant ing spring to regulate tension of bel The vertical adjustment of the table provides for work of exceptional thick

The belt standards are independent

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BORING TOOLS

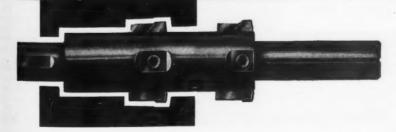
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Made in multiples for line boring, the famous Davis Block Type Boring Tool pictured below is designed for successful use on rough, semi-finish, and finish boring operations. Operation at maximum efficiency is assured by quick and accurate interchangeability of Davis block type cutter. This tool should introduce new standards of economy into your line boring jobs. Send us blue prints of your work for specific money saving recommendations.

DAVIS BORING TOOL DIVISION LARKIN PACKER CO., INC.

St. Louis, U. S. A.



per, 194 November, 1940

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MODERN MACHINE SHOP

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and are built of heavy structural the electrically welded together. They was half of self-supporting and can be placed at a mision of distance apart to accommodate well turned length of work. An auxiliary beginn of the placed on the regular table for handing of while exceptionally long work.

placed on the regular table for mamma properties of while the table frame is built of heavy 24, and out angle steel, electrically welded togeth for the table. The work table has racket in vertical adjustment by handwheel of the table stands 32 in. from the table table stands 32 in. from the table stands 32 in. from the table table stands 32 in. from the table table stands 32 in. from the table ta

long and is built of wood.

The main sand belt pulled

The main sand belt pulleys are 12a diameter x 8-in. face and will accommodate belts up to 8 in. wide. Bearing of the sander are of the heavy du dust proof type, equipped with Alemi fittings. The sander is furnished widirect drive from a 2 h.p. motor 20 a 440 volts, a.c., 2 or 3 phase, 60 cycles For wood finishing, the belt travels a approximately 5,000 s.f.m. For multinishing, the belt travels at approximately 18,000 s.f.m., which is the standard speed used in most metal working shops.

Michigan Hob-Checking Fixture

A hob-checking fixture designed for routine checking of hobs after shapeing has been announced by Michigan Tool Co., 7171 E. McNichols Rd., be troit, Mich. The fixture is said to check hobs for radial sharpening, spacing of flutes, and runout of hobs, and can also be used for checking single form relieved cutters or form gashing cutter for sharpening and spacing.

The fixture is universal in design and has a maximum capacity of 12 in. ameter and 15 in. between centers. In dial indicator can be moved in both horizontal and vertical planes, while the head carrying the indicator can be moved parallel to the centers for cheing at either end of a long hob. The up and down movement of the indicator accomplished by means of a micrometer barrel having a graduated dial to permit setting to any desired exact amount.

In checking a radial flute, the indictor contact finger is brought up to enter against the half block located on the tailstock, the top surface of this block being on the exact center line of the fixture. The finger is then set to about

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or handa y noting whether the indicator reads so while moving the indicator head heavy 2: a and out.

ed togeth for checking the runout on the diantial base racket is provided on the side of the wheel of lide. A standard indicator for checking from a mout may be mounted on this bracket.

to 2: haccuracies in readings due to play at from the



Michigan Hob-Checking Fixture

the centers is avoided by mounting the to check index plate on the arbor, thereby makcan also ing the centers solid. The pawl which engages the index plate is mounted on the headstock of the fixture in a posi-tion which prevents loosening in its

sign and The Michigan Hob-Checking Fixture has an overall size of 38 x 20 in., a shipping weight of 450 lb. and is furnished complete with an index plate, 14 x 6-in. arbor, and indicator.

Bates No. 5 Name Plate Stamping Machine

To combine the features of the Bates Name Plate Stamping Machines Nos. 2 and 3, H. O. Bates, 251-257 N. Broad St., Elizabeth, N. J., has developed the No. 5 name plate stamping machine shown in the illustrations herewith. The machine is also said to incorporate a number of improvements.



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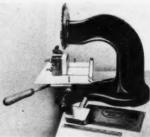
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(Left) Fig. 1-Fim View of Bates No. 1 Name Plate Staming Machine. (Eigh ing Machine. (Eigh Fig. 2—Side View in Bates No. 5 Nam Plate Stamping Machine.

The old No. 2 machine stamps name plates or parts up to ¾-in. thickness and up to 7½ in. square. The No. 3 unit stamps parts or pieces up to 2 in. thick by 8 in. left to right by 7½ in. front to back. The No. 5 machine stamps name plates, parts, or pieces from 0.005 to 3¼ in. thick and up to 9 x 7½ in. square, thus permitting the stamping with letters and numbers of assembled manufactured parts or pieces and also the stamping of name plates after assembly where practical, providing the overall dimensions of the assem-

bled part do not exceed a size of 9 x 8

x 31/4 in. thick.

The No. 5 machine has a double row heavy duty bearing in the diwheel for case

turning and accuracy. The completation assembly is extra heavy and bulk precision. By means of the powers screw pressure principle, up to near three tons can be applied, which per mits letters and numbers to be stamp into stainless steel and other alloys metal. The depth of impressions a also be controlled for stamping soft metals and plastics.

The Bates No. 5 Name Plate Standing Machine is furnished standard with any one size of dies from 1/32 to in a complete alphabet, and a set of a ures. Special characters can be autouted if desired and extra die when

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Staples reamers do not need to be reground after each resizing—the fast simple resizing operation (patented) automatically provides clearance without regrinding and also provides parallel and equal outward expansion of tips. Each expansion of the reamer further tilts the blades, presenting in effect, a new cutting edge. It is not unusual to find Staples type Carboloy-tipped reamers expanded several times without a regrind and without affecting the finish of the hole. Adjustments can be held to .0001". Write for leaflet. Sold through Carboloy Company or direct from—



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MODERN MACHINE SHOP

November, 1941 November



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ically

POWER VANE GRINDERS

can be furnished for interchanging to stamp several sizes in the one machine.

Special fixtures are made to order to hold shapes and contours that do not fit into the standard machine. The No. 5 machine is particularly adaptable for stamping numbers, letters, and other characters into airplane and motor parts as well as gages, guides, and dials. Patented, it is said to be the only machine of its kind having single replaceable dies.

able dies.

Figure 1 shows a front view of the Bates No. 5 Name Plate Stamping Machine with a stainless steel name plate size 7 x 3½ x ½ in. thick in marking position. Figure 2 is a side view of the No. 5 machine showing a special assembled part ready for the stamping of a part number. Beside the machine is a

name plate, machine tool, and graduated scale each of which has been stamped in the machine.

Sperry Hydraulic Piston Rod Parter

The Sperry Piston Rod Parter illustrated herewith, product of Sperry Products, Inc., 1505 Willow Ave., Hoboken.

N. J., is essentially a high capacity hydraulic jack specially designed to into locomotive crossheads for the pose of pressing out piston rods. I means of the unit, the fit between on head and piston is said to be quick and easily broken without damage these two important elements of log motive mechanism. Compact constraint, it is claimed, assures convenigant efficient operation.

The Sperry Piston Rod Parter available in two types of jacks: name Type J-4-D and Type J-5-C. The Ty J-4-D Jack is for use in crossheads w from 4 to 5 in. between cheeks. To jack measures 318 in. in width, has maximum total parting force of 150 ton and weighs 33 lb. The Type J-5-C in is designed to fit crossheads with 5 or more between cheeks. It measure 418 in. in width, develops a total per ing force of 250 tons, and weighs 511 The largest and most tightly fitted me are said to be quickly and easily tracted with this jack. Either one both jacks may be supplied accord to particular shop requirements.

The Sperry Piston Rod Parter is signed for portable mounting and venient one-man operation. All come



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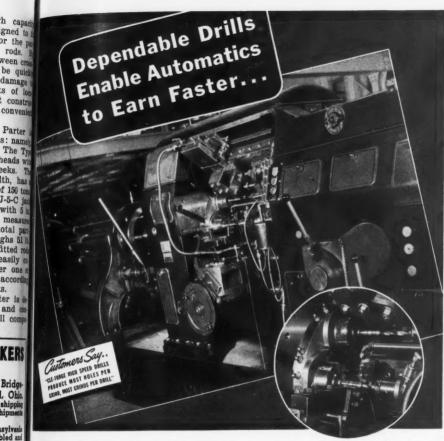
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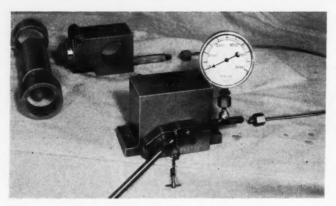
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Sperry Hydraulic Piston Rod Parter

nent parts are made from special high grade steel alloy, heat treated to withstand extreme hydraulic pressure. Exposed parts are of highly rugged design for continued satisfactory performance in heavy duty shop work.

in heavy duty shop work.

In setting up the piston rod parter, adapter bushings are first installed in the crosshead wrist pin holes. The cor-

rect size of jack then placed in th crosshead and he firmly in position by a dummy win pin which passe through the jag and is supporte on each end wit an adapter bush ing. The jack thus held in or rect alignmen without the use wedges or loos filler blocks.

The hydrauli force required in press out a pirton rod is supplied by a Type

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ton rod is applied by a Tp
P-1-A pump which is connected to it
jack by a heavy wall steel connecting
tube. The pump is capable of delivering
35,000 p.s.i. and weighs 65 lb. Only
few strokes of the pump handle are required in order to break the tights
piston rod fit. The force has its restion taken up over that section of the
crosshead designed to take enormon

How do CERRO ALLOYS cut costs?

- Fill out, tear out, find out

- CERROMATRIX. Please send me information on this low-temperature-melting alloy that expands slightly on solidifying. I understand it is used for securing punch and die parts, anchoring machine parts without the expense of a drive fit, engraving machine models, stripper plates, chucks, etc.
- CERROBEND. I would like to know about this alloy, which is used for a filler in bending thin-walled tubes to small radii and for other purposes.
- CERROBASE. Send literature on this metal, which I understand is used for reproduction of master patterns, models for electroforming, engraving machine models, seal for nitriding and annealing furnaces, proof casting for forging dies, etc.

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HIGH SPEED

CUTTING END WELDED TO TOUGH ALLOY SHANK

YOUR PRODUCTS

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MARKING BY ROLLING IS FAST AND **ECONOMICAL**

PRESERVES DIE LIFE AND PIECE PARTS. REQUIRES ONLY FRAC-TION OF APPLIED PRESSURE AS COM-PARED TO STAMPING.

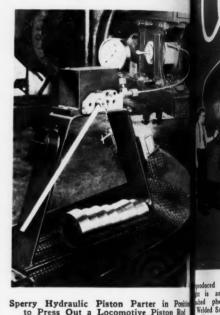
> QUICK **SET-UPS**

MODEL 25 HI-DUTY MARKING MACHINE

This machine operates from your plant This machine operates from your plant air line, and is one of numerous models built to produce fast, neat marking on metal parts. Hi-Duty marking machines may be had for practically any marking operation, and we will be glad to make recommendations upon receipt of your inquiries. Send prints or samples of parts to be marked aboving lattestice and to be marked, showing lettering and location, also state required production.

GEO. T. SCHMIDT, Inc. 1806 BELLE PLAINE AVE. CHICAGO, ILLINOIS

connecting rod thrusts. According to it manufacturer, there is no impact the stress is slowly and evenly distri uted on both sides of the crossh thereby eliminating possibility of a tortion of wrist pin holes. The harden steel ram insert of the jack is align flush against the end of the piston



Sperry Hydraulic Piston Parter in Position to Press Out a Locomotive Piston Rod

protecting the lathe center hole against possible damage.

After a piston rod has been presse out, the jack is removed from the cross head and the ram returned to its cylider by means of a wrench inserted it the end of the retracting pinion. The oil, thus being forced out of the cylin der, is returned to the reservoir through a by-pass valve which has been opened for this purpose. With the by-pas valve again closed the piston rod puter is ready for another operation.

Bridgeport Trimmer No. 4

The Hardware Specialty Mfg. 04. Bruce Ave., Stratford, Conn., is at nouncing the improved Bridgeport Trim e Bases

Mahon pert Weld

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... YOUR Product Deserves this Added Appearance Value

The added appearance value of accurately fabricated. smoothly finished Welded Steel Machine Bases will help to build your reputation for quality workmanship... Many alert machine manufacturers have been quick to recognize this plus value in the unusually fine finished appearance of frames and Bases turned out by The R. C. Mahon Company. This finer finished appearance indicates greater accuracy in fabrication and superior workmanship on the part of the craftsmen engaged in the production of these bases which become the foundation of YOUR product. If you demand machine bases of unusual accuracy and exceptionally fine finished appearance—bases upon which you will be proud to place your company's name—send your blue prints to Mahon for quotations.

THE R. C. MAHON COMPANY

Manufacturers of Machine Bases and Many Other Steel Products.

duced at the is an unrephotograph Welded Steel Main Bases produced Mahon for the ert Welding Mae Co., Detroit, ich. Above is the tra-Speed Welding thine for which e Bases were built. his machine was signed to spot weld e tear window reintement to the roof nel of an automo-le body.

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MAHON



Bridgeport Trimmer No. 4

mer No. 4 shown herewith. The unit is said to be invaluable to wood pattern shops since it has been especially designed for cutting wood either square, round, or miter-joint. According to the manufacturer, the trimmer is simple to

operate, accurately graduated, and equipped with high speed knives with produce a smooth and accurate finish

Mahr 12 x 18 x 6-In. Tool Furnace

Fini:

Developed especially to meet the mand for a low cost furnace having mitive combustion control, the Mahr is 18 x 6-In. Tool Furnace shown herein product of the Mahr Mfg. Co., 172 Second St., Minneapolis, Minn, has combustion chamber which is design to give uniform heat throughout inhearth area at any temperature defor any treatment of the various stars.

According to the manufacture, a new improved control eliminates gus ing and assures positive results in can be repeated at the will of the a crator. The special proportional air mixer has a vernier control graduate for easy and quick setting. The open tor can make a temperature chart adjustments and can also chart an number of specific processes for the ment of the various classes of stell other metal. The ratio may then to



FOR REALLY GOOD BOLT DIE STOCKS

may we suggest the "TOLEDO" No. 101 $\frac{1}{4}$ " to $\frac{5}{8}$ " or the "TOLEDO" No. 102 $\frac{1}{2}$ " to 1" to either N.C. or N.F. thread.

Positive die adjustment for deep or shallow threads. Segmental dies are easily resharpened or replaced at low cost. Tools are well balanced and operate easily. Low in cost and sold in leading supply dealers. Full details on request.



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NEW YORK OFFICE: 502 No. 2 RECTOR STREET BLDG.

MODERN MACHINE SHOP

November, 1941 Novem

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IF YOU HAVE THESE JOBS TO DO...

Finishing metal - Removing rust from metal Fitting metal parts - Cleaning up metal for brazing



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May of the jobs listed above ... and an almost endless number of hers...can be speeded up and done better by using Aloxite Brand Aminum Oxide Coated Abrasives. These products are among the not useful of all forms of abrasive finishing materials and can be ned for almost any operation requiring the gradual cutting away of and or the producing of a smooth surface.

to I" for Morite Brand Coated Abrasives are available in sheet, roll and ix form in all necessary grit sizes. There's a coated abrasive suitthe for every kind of sanding job ... from the production sanding of momobile bodies to the delicate hand polishing of a small steel pened or is. Ask the Carborundum representative to give you the complete story next time he calls.

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ALOXITE BRAND ALUMINUM OXIDE ABRASIVE CLOTH

Sheets ... Rolls ... Discs

Cuts faster ... lasts longer...gives more uniform finish!

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Convince yourself that Bristo's faster, easier, tighter set-up means speedier assembly, stronger construction, minimum assembly cost. All you have to do to get Bristo Socket Screws for an "on-the-job" tryout, is to mail in the handy coupon below. It brings you a tidy selection of Bristo Screws and Wrenches for you to set up-either on your products or your production machinery:

BRISTO'S THE CHOICE . . . for good reasons!

These easy-to-handle socket screws set up tighter, and with less effort. And they stay tight, too,—holding with a grip that defles vibrations. The exclusive fluted design of the socket head permits greater force without weakening, without danger of stripping or rounding out. Time and again a Bristo can be backed off and retightened without damage to the socket. Use of a Bristo reduces necessity of frequent replacements. Assembly time is saved. No won-

der so many manufacturers have standardized on Bristos !!

MAIL THIS COUPON!

Free Bristo samples, and Bulletin 83-8P which gives you facts on these labor-saving screws, are ready for you. Send for both today. The **Bristol Company, Mill Supplies Divi**sion, Waterbury, Conn.



THE BRISTOL COMPANY, Mill Supplies Division

Send me sample Bristo Socket Screws and Bulletin 83-8#

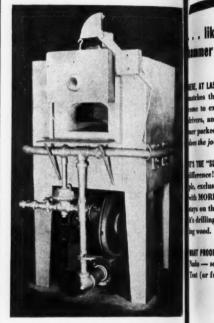
SOCKET SCREWS

Name

changed to either oxidizing or reduce at positive settings by movement of vernier control. The record chart results desired permits instant setting for future repeat operations.

The Mahr 12 x 18 x 6-In. Tool F

nace is gas underfired and is equipp with four premixed gas burners a ranged for single valve control. It has a graduated blast gate for primary ting to adjust for any class or grade



Mahr 12 x 18 x 6-In. Tool Furnace

gas used in industry, and is lined wi special quality refractory to give l service life. The frame is of all weld steel construction. The furnace is it nished with or without blower.

Delta Surface Plates

To meet the need for inexpensive, curate, and handy surface plates buse in layout work, the Delta Mfg. Co. 698 E. Vienna Ave., Milwaukee, Wis has brought out two surface plats measuring 15 x 8 x 3 in. and 16 x 21 3 in. According to the manufacture

MODERN MACHINE SHOP

November, 1940

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Packed with Power

... like no portable electric

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EE AT LAST, is an electric hammer that sides the brilliant performance you've was to expect from electric drills, screwings, and other portable tools! A hammer packed with power . . . a hammer that hat he is b — the new THOR NADO!

IN THE "SLING-SHOT DRIVE" that makes the Merence! This radically new power-principle, exclusive with Thor, packs each blow with MORE POWER! Gives you a tool that with the state of the sta

IMI MODF? Then actually try the Thorlaid — send the coupon for 10 Days Free lat (or full details). Now!





. . . is the simple, yet ingenious rubber connection that drives home Thor-Nado's piston, lashing it 1600 times a minute in powerful hammer action. Though long lived, it's cheap and easy to replace.

NOR-NADO PORTABLE ELECTRIC HAM MER

INDEPENDENT PNEUMATIC TOOL CO.

600 W Jackson Blvd., Chicago, III.

INDEPENDENT PHEUMATIC TOOL CO.

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- One Thor Nade hammer for 10 days Free Trial (Specify voltage desired.)
- Full information on the Thor-Nado

Name
Firm Name
Address

November, 1940

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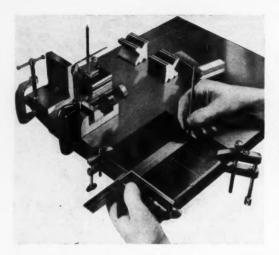
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MODERN MACHINE SHOP

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Moslo Welding Rd Hopper Feeding Machine

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these surface plates provide a true surface with which to start and feature a massive design and properly ribbed casting to ensure accuracy of the surface, ledges at the edges of the plate for clamping purposes, and edges that are square with each other and square

Illustrated herewith is the la Welding Rod Hopper Feeding Main which has been brought out by la Machinery, Inc., 5005 Euclid has Cleveland, Ohio. The machine is signed primarily for passing state ened and cut wires or rods into me the state of the stat



Gullman Wheel Co

1336 Altgeld St., Chicap

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FELTS manufactured to

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Felters Certified Felts set the standard in piece goods or washers, gaskets, strips, wicks and diecut shapes.

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WE INVITE YOU TO CHECK THESE FACTS

A DREMEL MOTO-TOOL OFFERS

/ 27,000 R. P. M.

(The speed essential for good grinding and to conserve cutters)

FULL BAKELITE SHOCKPROOF HOUSING WRENCHLESS CHUCK





Compare, feature for feature, any of the small offhand grinders on the market, regardless of price, with a Master Model Moto-Tool. Then note that in addition to its many exclusive advantages the Moto-Tool is precision - built for precision work. Its armature is dynamically balanced to eliminate vibration. It has oilless (oil sealed) bearings and built-in cooling fan. Air filter keeps out dirt and grinding particles. Weighs only 13 ozs. Operates on either AC or DC 110-120 volt current. Sold by better dealers on 10 day, money-back trial. Write for catalog of Dremel tools, equipment and special combination offers.

DREMEL MFG. CO. Dept. 220-L Racine, Wis.

INSIST ON A DREMEL мото-т

trusion press for application of coun material to welding rods.

The hopper of the machine is entirely of steel plates and has cape for approximately 500 lb. of wire m The guide plates of the feeding men nism are arranged so that adjustment is made from a single hand screw, positive adjustment assured. In a manner, the smallest to the larger ameter rods can be fed without the



Moslo Welding Rod Hopper Feeding Machin

culty of interrupted flow caused by mis alignment.

Speed of the machine is controls through an adjustable Reeves drive which is said to permit absolute match ing of feeding speed with whatever trusion press the feeder may be use Feeder rolls are located in a vert cal plane, while support shafts a in a horizontal plane, thereby provi ing greater accessibility. The pick-rolls have a single hand screw adjus ment so that movement in or out simultaneous. Feed pressure is mail tained through a heavy duty spring

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The new

because :

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positive and accurate. By means of guide tubes, adjustment of wire is always maintained. This adjustment also permits full compensation for wear of rollers, thus providing longer life.

The power drive mechanism is totally enclosed and runs in oil on Timken roller bearings. Hardened alloy steel gears are said to assure long, trouble-free performance, and ample oversize gears and bearings are said to eliminate any possibility of failure in the drive unit.

The Moslo Welding Rod Hopper Feeding Machine is supplied in three sizes of hopper to take wire in 18, 24, or 36-in. lengths. Each size machine is capable of handling any length up to its maximum. Right or left-hand operation is optional and feeding height is matched to the extrusion press.

"Buffalo" Motor Spindle Drill

Buffalo Forge Co., 388 Broadway, Buffalo, N. Y., announces the "Buffalo" Motor Spindle Drill shown in the illustration herewith. The drill is available in pedestal models only and is furnished in two sizes; namely, a No. 2 with 8 and 13-in. overhang and a No. 3 with 13-in.

overhang only. The No. 3 machine powered by means of a 3 h.p. motors the No. 2 machine by means of a 2 h motor. The machines can be furnish with or without back gears, with without power feed, and with or without motor reverse for tapping.

The spindle of the drill is of all steel with six driving splines. It mounted in precision ball bearings ample size to carry both the radial at thrust loads. The spindle nose is No. Morse taper on the No. 3 machine as No. 3 Morse taper on the No. 2 mm Provision is made to take up thrust a play as well as for ample lubrication.

The motor of the drill is semi-enclose self-ventilated, and full ball beam mounted. The 2 h.p. motors are awa able in three ranges; 3,600, 1,300, 1,300 or r.p.m.; 1,800, 1,200, 900, 600 r.p.m. and 1,200, 900, 600, 450 r.p.m. The 3 h motor is available in one range only 1,200, 900, 600, and 450 r.p.m. These speeds represent the four "open" speeds represent the four "open" speeds represent the four "open" speeds prepared to see the speeds. The back gear ratio is 4 b 1. A drum-type pole-changing swind is provided for starting, stopping, and changing motor speeds. Overload pretection is obtained by a thermal overload device mounted on the moom.

FLEXOID

INDUSTRIAL COUPLINGS

Thermoid Hardy Type

A coupling by which ends of shafts are permanently bolted to flexible Thermoid fabric discs—no metal-to-metal bearing surfaces. Provides strong, durable, pliable joint, requiring

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All shocks, vibration and jolts absorbedincreasing life of driving unit. Openates horizontally or vertically. No back lash—suitable for reverse rotation, Write for data and prices.

FLEXOID COUPLING CO.

The Smith Power Transmission Co., 1545 East 23rd St., Cleveland, Ohio

Fast Service on electric tool repairs

25 Factory Branches

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Has Factory Service
Branches From
Coast-to-Coast!

When you use Van Dorn Tools, you don't have to send 'em "back to the factory" for servicing. No matter where you are—there's a Van Dorn Service Branch within quick reach—equipped with repair and servicing facilities, manned by factory-trained mechanics. You get "factory" service with no delays, no valuable time wasted. All Service Stations are operated by Van Dorn to assure you of genuine replacement parts and responsible service—backed by the Van Dorn guarantee. Van Dorn Electric Tools, 720 Joppa Rd., Towson, Md.



HEADED" PORTABLE ELECTRIC TOOLS

PAYS FOR ITSELF Quickly



BLACK DIAMOND Precision Drill Grinders give you the simplified, fast and accurate drill grinding that quickly pays the cost of the machine. It holds the drill in a fixed position while making a complete revolution. Lips are ground exactly the same length giving the proper angle and clearance to insure easy cutting.

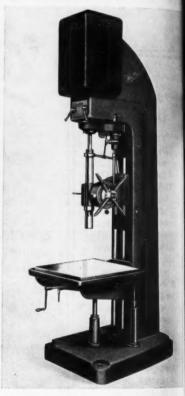
No. 1 grinds drills No. 60 to 11/32" without complicated adjustments. No. 2 grinds drills 1/16" to 1/2". No. 3 grinds drills 1/8" to 3/4".

WRITE FOR BULLETIN No. 121

BLACK DIAMOND SAW & MACHINE WORKS, INC.

45 NORTH AVE. NATICE, MASS.

Under-voltage protection is obtained the use of magnetic contactors mount ahead of the drum switch. A fused is connect switch can be mounted also of the magnetic contactors and is any able in a separate case or in the amount of the magnetic control. The units are mounted in the upper columns are mounted in the upper columns.



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"Buffalo" Motor Spindle Drill

All electric wiring is enclosed in the column.

The back gear unit, which is of the "cartridge" type, is a separate self-contained device mounted with the upper frame, and is full ball bearing. The high speed gears are of helical construction and the sliding gears are 20 depressure angle combination pitch gan to ensure additional strength and quiet operation. The back gears are engaged and disengaged by a handle conveniently mounted. An interlocking device be

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A Symbol of Perfection

The metal plate shown above is a symbol of the perfection and quality built into the equipment to which it is attached. The name McGILL on a bearing is your assurance of real value and satisfaction in performance.

Why not learn more about the various types of McGILL Bearings and how you might use them to advantage.



New McGILL Maximum Capacity Ball Bearing



McGILL Solidend MULTIROL Bearing

Send for Catalog — BEARING DIVISION

MEGILL MANUFACTURING COMPANY

1500 N. Lafayette Street
VALPARAISO • INDIANA

November, 1940

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MODERN MACHINE SHOP

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tween the back gear shifting handle and the motor switch precludes any possibility of the back gears being shift-ed while the machine is running under motor power.

The power feed unit used on the Buffalo Motor Spindle Drill is a sturdy, fool-proof, rugged, simple, all-geared drive. The high speed gears are of helical construction and ball bearing mounted. The "pick-off" gears have hardened steel inserts to prevent keyway wear from shifting. All gears run in gear grease and ample provision is made for lubrication of all moving parts. The hardened tool steel worm is full ball bearing mounted to take thrust and radial loads. The clutch members are hardened and tempered tool steel and the design is said to be absolutely foolproof and trouble-free.

The Buffalo Motor Spindle Drill can be equipped with one of three types of tapping devices: (1) a friction type tapping attachment; (2) motor reverse control operated by a small lever switch, or (3) automatic reverse feed handle control. Any commercial friction-type tapping attachment can be adapted to the machine. The motor reversing tapping is accomplished by means of an versing magnetic control. Since motor has four speeds, it is necess to select one speed for reversing else have as many reversing control

desired—one for each speed.

The capacity of the No. 3 drill is in. in cast iron or 1½ in. in mild is The No. 2 capacity is 1 in. in cast in. and % in. in mild steel.

Accessory Equipment Available for Millmaster Vertical Milling Machines

According to an announcement me by Midway Machine Co., 2324 University Ave., St. Paul, Minn., new accept equipment for Millmaster Versi Milling Machines, one of which was scribed in the September, 1940, issue MODERN MACHINE SHOP, is a available. De luxe model Milmasin now include center or third pulley a tachment and table power feed atta ment as standard equipment. The tal power feed attachment or unit fumish power feed to the table on longituding



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ns of a Bunting Standardized Bronze Bearings and Tubular and Solid Bearing Bronze Bars are cast and machined with

the same care and skill that is given to the most exacting items made to blueprint. These better standardized products are instantly available in every size usually needed, from responsible wholesalers in all markets. Write for the new easy reference Bunting Catalog . . . The Bunting Brass & Bronze Company, Toledo, Ohio. Warehouses in All Principal Cities.



PRECISION BRONZE BARS . BABBITT



Since neces versing controls drill is mild st a cast i

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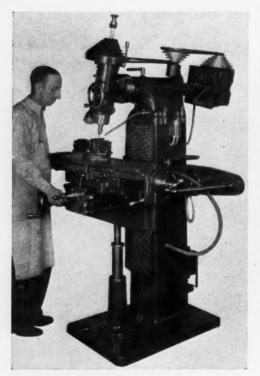
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Millmaster Vertical Milling Machine

travel only. A $\frac{1}{4}$ h.p. three phase motor is utilized and provides seven speeds with stop-start-reverse.

All Milmaster models, standard and de luxe, are now furnished with a motor driven pump and storage tank for coolants or cutting compounds as standard equipment. The pump and tank are installed in the base of the man furnish a constant supply of a pound direct to the work. Go ity drain returns the liquid to the tank, thereby eliminal all waste. The motor is a single phase and the pump is the vane type. An indexing he stock and tailstock for all man is also announced.

Dor

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Vernier attachments for precision work are now avalated for all model Millmasters and der. The attachments consist vernier scale and vernier areading in 0.001 in., a 24-in longitudinal scale, and a plong transverse scale. Special mill holders for heavy duty ming can also be obtained for models. The holders are optically in place of collets as standing equipment or are obtainable accessory equipment.

Midway also announces to two important changes have to made in Millmaster specification namely, the length of the morking size has been increased from 26 in. to 38 in., and the weight of the machine has beingreased from 1,600 to 1,800.

Wesson Universal Angle Plate

A machine tool fixture which is at to greatly increase the range of which can be performed on drill presgrinders, and milling machines, to known as the Wesson Universal Applate, has been announced by the Wesson Co., 1050 Mt. Elliott Ave., Den Mich. The fixture is similar in construction.

BOKUM Long Life Boring, Bottoming and Internal Threading Tools



... for holes from 3/32" up. Three types... twelve sizes. Real money savers for lathe, jig borer, screw machine or boring mill.

Write for bulletin and price list.

BOKUM TOOL CO., INC.

49 W. Hancock St. Detroit, Mich.

Licensed manufacturers of all types and designs
of Carbide Tipped Tools



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Plate

WE thought we knew all about MOMAX steels a long time before we began to use them. I regret the delay. One day our tool engineer had some of our pieceworkers supplied with MOMAX bits. That settled it. With less time out for changing tools—cutting more metal between grinds—the pieceworkers and we both wanted more MOMAX. Now nearly all our high speed tools are made of these steels. We found MOMAX suitable for any application for which other high speed steels have been successful and our new tools average twenty per cent higher in efficiency. Nobody is going to talk us out of that gain. Don't let anybody stop you.



MO-MAX

MOLYBDENUM-TUNGSTEN HIGH SPEED STEELS

leading steel companies can supply you with their licensed brands of MOMAX. For booklet with technical data and sources of supply, write The Cleveland Twist Drill Company, Cleveland, Ohio.

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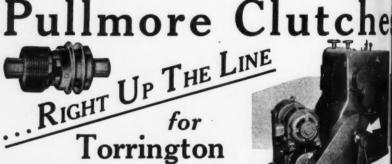
Wesson Universal Angle Plate

tion to the Wesson Universal Vise previously announced. Instead of vise jaws, the universal base with patented cradle design is fitted with a slotted top plate. The plate may be adjusted in three planes, each plane completely graduated. Through the use of the Wesson Angle Plate, parts which are too large or of too irregular shape to be conveniently held in a vise can be clamped by means of T-slots in the top plate.

According to the manufacture, Wesson Universal Angle Plate is ticularly adaptable for work into a variety of operations using the angle. Once the work is clamped angle plate and the angle establist need not be disturbed since the advice may be moved from one mainton another without removing the ward another without removing the ward and the angle establist in the wesson Angle Plate is said a particularly useful in shops where in ing, grinding, and milling machine not include equipment for universal angle setups.

Sheffield Multicheck Electrical

The Sheffield Multicheck Election shown herewith, product of the Shefi Gage Corp., Dayton, Ohio, is a prision instrument designed for the minspection of mass production put having several critical dimension, for example, the several diameter a shoulder lengths of an armature that the present, the gage is being will used for the inspection of timing is elements, shell bodies, cartridge and miscellaneous army ordnance will measurements of length, diameter



Spring-Making Machines

First on smaller models, now used in the entire line, Pullmore Clutches prove "very satisfactory and economical" for controlling main drives of Torrington Spring-Making Machines.

Dependable, easy-operating, compact, powerful, Pullmore Clutches are employed on many kinds of industrial equipment for controlling main or auxiliary drives. Write for Pullmore Catalog.

Pullmore Milli disc Clutchs made in single double type, is eration in el a in many coper ranging fee ils 75 h.p. at 50% Investigate. up to 1

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Catherine Street, Rockford, Illinois, U.S.A. Corp Sold by MORSE CHAIN CO., Ithaca, N. Y. With Offices in Principal Cities

ROCKFORD DRILLING MACHINE DIVISION

MODERN MACHINE SHOP

November, 198

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up to 100 lbs. operating pressure

HEREVER you need controlled power to push or V to pull, raise and lower, through rods, levers or toggles—your best bet is a cylinder—a Hanna Cylinder! They'll do that work with dependable efficiency at a cost that is really low. Maintenance? - you can practically forget it.

Hanna Cylinders have replaced manual effort in hundreds of operations — they have simplified all types of machine control and actuation in every kind of equipment. Results have always demonstrated improvement and economy. You'll be able to use them too . . . in the machines you build or in your plant operations.

There is a standard model Hanna Cylinder, air or hydraulic, to fit your problems. Put them to work for you.

Write for Low Pressure Cylinder Catalog No. 228 - or Hydraulic Cylinder Catalog No. 229.



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Air and Hydraulic RIVETERS Air and Hydraulic CYLINDERS

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MINIMUM FRICTION MAXIMUM EFFICIENCY



Model UL with 1/4 H.P. Motor and No. I Tank

The full ball bearing construction of Gusher Pumps minimizes friction. The absence of packing glands, foot or relief valves, together with the simplicity of design, are factors which enable you to get maximum efficiency with a constant, dependable supply of coolant. Write for engineering data sheets and see for yourself why leading machine tool manufacturers choose "Gushers."

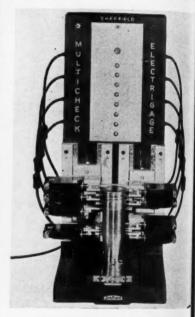
THE RUTHMAN MACHINERY CO.
538 E. FRONT ST., CINCINNATI, OHIO
LABGEST EXCLUSIVE BUILDERS OF COOLANT PUMPS

depth are flashed simultaneously on control board by means of colored signal lights as the part being inspected is placed in gaging position. An individual gaging head is incorporated free each dimension to be checked, and each head actuates a signal light. Whe one of the signal lights shows ambein the gaging operation, its diameter is within tolerance. When the light show

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Sheffield Multicheck Electrigage

red it indicates that the diameter is undersize, and when green, oversize.

In addition to the individual signil lights (one for each measurement), gage has a master signal light which integrates all measurements. When the master signal shows white, all dimensions are within tolerance. When the shows red, the individual signal por lights are observed in order to determine which dimension or dimensionare incorrect and whether they are plat or minus.

Only one light lens is necessary for each dimension, and the several lens are usually placed in a straight line above or alongside each other. A plat of the work part is shown, and this

MODERN MACHINE SHOP

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NON-CHATTERING--BYPASS PISTON TYPE OIL RELIEF VALVES

An important use of these modern valves is in connection with oil hydraulic pumping units, where a specific pressure is required to be maintained, especially on machine tool hydraulic mechanism, oil burning equipment, rams, presses, etc.

The cylindrical piston closes off the port in a shearing manner and does not seat abruptly against body of valve, thereby overcoming any pounding or chattering noise, ordinarily encountered with standard valves using disc seats.

They are made in pipe sizes from 1/4" to 2" and are suitable for pressures from 0 to 350 lbs., with a change of but five different springs for the pressure variation (state pressure required when ordering).

Bodies may be of cast iron or brass and can be supplied with brass, hardened steel or stainless steel pistons.

Where fuel oil is used we recommend a brass valve with stainless steel piston, due to the fact that fuel oil contains a certain amount of, condensation and foreign matter, and a harder, non-corrosive piston is required.

FULFLO Valves require no attention after being installed and set for the required pressure.

The FULFLO Line also includes Centrifugal Coolant Pumps. May we send you bulletins?

THE FULFLO SPECIALTIES CO., INC.

LANCHESTER

OHIO

plan indicates each dimension with its

own signal light.

The patented Sheffield Reed Mechanism, which is characterized by accuracy, absence of frictional losses and absolutely positive action, is the heart of each electrigage head used in the assembly of the Multicheck gage. The Reed Mechanism employs no gears, knife edges or levers. In addition, the mechanism is said to have no rubbing contacts in its operation and consequently is not subject to frictional wear.

According to one user of the Sheffield Multicheck Electrigage, a single operator can check seven dimensions on a 75 mm. shell at the rate of 600 per hour without eye strain. The gage, according to the manufacturer, can be used on parts as large as desired and is being used on minute parts such as pinions less than ½ in. long overall and less than ½ in. in diameter. The diameters of both end trunions of these pinions are measured for diameter and at the same time the length of the pinion portion is checked.

The Sheffield Electrigage head is designed so that it can be applied in innumerable combinations. The head is a

self-contained unit, and if at any a the line of work upon which it is a changes, it can be dismounted and a plied elsewhere.

Hardinge Precision Index Center

An index center incorporating stu construction, large collet capacity, operation features to speed up produ tion in the milling of precision parts now being offered by Hardinge Brothe Inc., Elmira, N. Y. As shown in illustration, the compact box-like or struction minimizes the overall heir to act as a sturdy base for the spin section. The spindle is mounted super-precision preloaded ball bearing and, with the same support for machine spindle, provides a combination which is said to afford the greatest is gree of accuracy and rigidity for mi ing operations.

The spindle nose is threaded 244 diameter, 10 threads, and interchape nose attachments and collets with the machine spindle as well as with smale capacity Hardinge precision lathes. To

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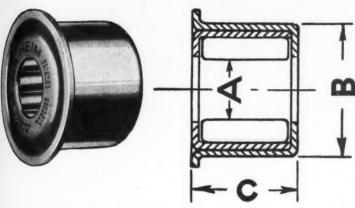
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HEIM FLANGED ROLLER BEARING



The NEW Heim Flanged Roller Bearing is an inexpensive bearing especially suited for agricultural machinery, factory trucks, and the like; also, hoists, wheel-barrows, vacuum cleaners, office equipment, casters, and many other installations where a dependable antifriction bearing is desired—but where cost is an important factor.

FEATURES

- Great load carrying capacity
- Simplicity of mounting.
- Retention of lubrication.
- Exclusion of foreign matter.

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THE HEIM COMPANY, Fairfield, Conn., U. S. A.

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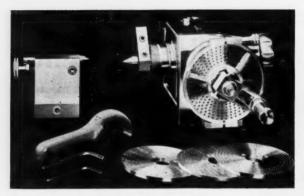
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Hardinge Precision Index Center

spindle section swings through an arc of 220 deg. and is graduated in degrees for settings from 10 deg. below horizontal to 20 deg. beyond vertical. A vernier in minutes is incorporated for fine settings.

The draw spindle is of two-piece construction which permits the spindle to be swung through an arc of 220 deg. The spindle is ground to directly take

standard 5C Hard which have collets range by fractions from 18 to 1-in. m %-in. hexagon or 2 in. square. Prec hardened spiral b gears and a nitrided ral bevel pinion pro a 4 to 1 ratio betw the spindle and the dex plate crank. The to 1 ratio is said to particularly advant ous in speeding up r ing operations. For dex plates are furn together with a listing all of the ions that can be ob ed from 2 to 360.

The index plate mounting is indepenent of the gearing with the spinds of crank, being engaged between the by means of a clamp on the superiphery of the index plate. Thus, we can be chucked and located as desirand the index plate adjusted accordingly.

Anti-friction bearings are provided a support for all gears and shafts. The

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PARTS where you want them--when you want them



You'll save time, space and labor handling parts and materials when you use these patented STACKBINS. STACKBINS keep parts instantly accessible — eliminate waste hand motions—stack compactly to form units of exactly the right shape and capacity—make order filling or assembly work faster, easier, more efficient.

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"STACKED AND STILL ACCESSIBLE"

Write today for full story on patents' STACKBINS, and learn new lessons is efficiency. Stackbin Corp., 53 Troy St. Providence, R. I.

MODERN MACHINE SHOP

November, 194



NOT that we are 108 years old -

NOT that we manufactured the first vise made in the United States-NOT that we are recognized by industry as the "VISE MAKERS"—

BUT To help you with your problems of stepped-up production and your urgent need for additional vises-of superior quality-Parker has acquired a new plant with 300,000 square feet of floor space. This is PARKER'S answer to the Defense Program.

And with these increased facilities, the same famous vises with their seven EXCLUSIVE features can now be quickly produced to meet your requirements. The Charles Parker Company, Meriden, Conn.



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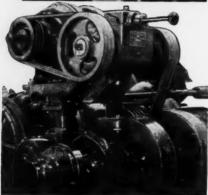
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TRANSMISSIONS







The Western MASTER on a Cincinnati milling machine-bracket included-\$95.00.

WESTERN MANUFACTURING CO. 3402 Scotten Avenue, Detroit, Michigan

spindle section has large swivel ings and positive locks to maintain gular settings. The spindle prop a lock which is applied after an i position is completed. Adjustable tioning stops permit the spindle withdrawn and accurately return an original angular setting.

The index head is arranged for hand mounting. The index head fitting the table are removable and base of the index head has a cross way which permits the spindle to placed parallel to the milling made cutter spindle. The index head m a 7-in. diameter and the index head tailstock have a combined length 14% in. A similar index head is offered for spiral milling, the motion of the spindle being obtain through a set of change gears from feed screw which is actuated by he or power feed. This index head imporates all the features of the pindex head and is furnished with chart covering all leads from 0.00 42.656 inches.

South Bend Series "S" Tool Room Lathe

A 16-in. swing underneath belt mot driven precision lathe having a nu of features which are said to save in on toolroom operations, to be known the South Bend Series "S" Tool Room Lathe, has been announced by the Soul Bend Lathe Works, 369 E. Madison 8 South Bend, Ind. The lathe is main 6, 7, and 8-ft. bed lengths, having distance between centers of 34, 46, basis in. The headstock has a 1% in pacity through the spindle and in collets up to 1-in. capacity.

The design of the Series "S" in

makes it especially adapted to fine t room work. A convenient arrange of controls is said to save time effort, thereby reducing operator fat and assuring maximum product Large diameter handwheels facili precision adjustments on close tole work. Adustable micrometer on the cross feed screw and com rest screw are large in diameter clear-cut, easy-to-read graduations.

Toolroom attachments supplied the lathe include a handwheel draw-in collet chuck, telescopic tage tachment, micrometer carriage thread dial indicator, and chip pan

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Flexibility Rigidity Unparalleled Range

AN outstanding product weighing 1600 lbs. with unusual range for large tool and fixture work yet extremely sensitive for fine milling on molding dies.

Also, high speed milling attachments for all makes of milling machines.

Write for further details.

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South Bend Series "S" Tool Room Lathe

electric grinding attachment, milling attachment and other attachments, chucks, and accessories are supplied to order.

The telescopic taper attachment is permanently attached to the lathe carriage and is always ready for use, regardless of the position of the carriage. To engage the taper attachment, two binding screws are tightened. The telescopic cross feed screw eliminates the necessity of disconnecting the cross feed nut when the taper attachment is to be used. The cross feed screw may

be used to adjust the turning tool for the magnetic diameter, and the taper attachment man then be engaged to change back to strain turning, the two bindus screws are merely loss ened.

The fully enclosed up derneath motor di provides eight st speeds ranging from to 725 r.p.m. vibration-free operation at high spindle spe said to be achieved b using a direct belt a to the carefully balan cone pulley and s assembly. The and driving mechan are mounted in the cal net leg under the head stock, and the cone pu ley belt passes a through the bed to th headstock. Back gear provide slow sp speeds and ample power for machining large diameters. A convenient belt tension release lever and wrenchless bull

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gear lock permit rapid changing of spindle speeds.

A full quick change gear mechanism provides a series of 48 power longitudinal carriage feeds of from 0.0015 to 0.0841 in., a series of 48 power cross feeds of from 0.0006 to 0.0312 in., and a series of 48 right and left-hand screw threads of from 4 to 224 per inch.

The bearings for the headstock splidle are unusually large, being of the integral type, and provide extreme righting, thereby reducing the possibility of chatter. The spindle is made of a special control of the spindle is made of a special co



SPEED REDUCERS

Build them into your special or production machinery to obtain clean, quiet, compact, positive reduction drives. Many stock sizes and ratios. Write for Catalog L-59 on Bond Stock Gears and Speed Reducers.







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MODERN MACHINE SHOP

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cial grade of alloy steel, with all bearing surfaces, including the tapered hole, carburized, hardened, and precision ground. The journal bearing surfaces of the spindle are superfinished to a smoothness of 5 microinches. The lathe bed is a heavy semi-steel casting with three V-ways and one flat way. carriage is heavily constructed, with long bearing surfaces on the bed ways.

The apron is a double wall one-piece type, providing rigid support for both ends of all gear shafts. Power carriage feeds are operated by a worm drive and series of steel gears in the apron which run in a bath of oil. The power feeds are controlled by means of a multiple friction clutch which can be engaged and disengaged instantly. clutch, according to the manufacturer, is constructed so that it will not stick or slip under heavy cuts.

Lyon Die Handling Truck

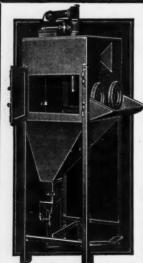
The Lyon Die Handling Truck shown in the illustration, product of the Lyon Iron Works, 573 Madison St., Green, N. Y., is designed for aiding in the removal and insertion of heavy dies in



Lyon Die Handling Truck

presses where the space for maneuver. ing a truck is rather limited. The truck is furnished with auto-type steer at both ends which is said not only to aid in maneuvering the truck in close quarters, but to add to its stability as well.

Turning of the wheels is controlled by a turning bar to which a removable handle is attached. This handle is arranged for hand drawing or towing



REMOVE HARDENING

CLEAN CASTINGS, SATIN FINISH LEIMAN BROS. Continuous Feed (PATENTED) SAND BLAST OUTFIT

It furnishes a modern, cleanly way of cleaning moulding sand from patterns and castings. Letters and designs steaded
Will replace the scratch brush for mat finishing and simlar effects on all classes of goods-it will replace the use of disagreeable acids for this work.

Finishes may be fine, medium or coarse on all materials desired-but, most important, it will always be uniform-s streaky, uneven results.

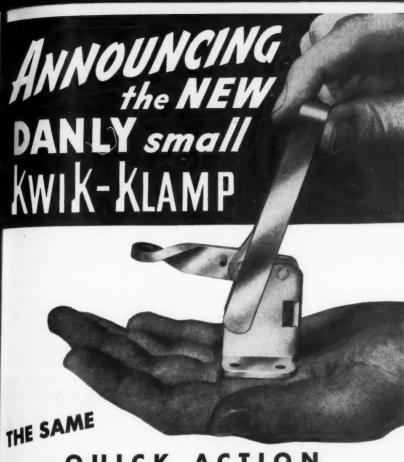
Any article to be plated should be sand blasted first-it will result in a more permanent plate, a quicker plate, and a saving of time in plating and a saving of current.

The most inexperienced person can operate it without is structions—the work cannot be spoiled.

USED METAL, PLASTICS, GLASS, Etc.

The sand blasting process makes a surface to which electro The same pasting process makes a surface to which election plate will adhere more securely and much more rapidly as so sand blasting saves time in plating, and improves your finish. This also applies to articles to be painted, sprayed enameled or otherwise treated. Mat finishes of various degrees are quickly secured.

168-2 CHRISTIE ST. BROS., Inc. NEWARK, MAKERS OF GOOD MACHINERY FOR 50 YEARS



QUICK ACTION
THE SAME POSITIVE CLAMPING AS
ALL DANLY KWIK-KLAMPS

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1549 Temple Avenue, Detroit, Mich. 16 Commercial Street, Rochester, N. Y. 1745 Rockwell Ave., Cleveland, Ohio

3913 North Broad St., Philadelphia, Penna.

Ducommun Metals & Supply Company, Los Angeles, Calif.; San Francisco, Calif.

DANLY DIE SETS and DIE MAKERS' SUPPLIES

back of a power truck and may be drawn from either end. The truck is arranged so that wheels on either end may be locked in position for drawing at the opposite end. One wheel on each end is furnished with a braking arrangement to hold the truck in posi-

tion when loading or unloading dies.

Specifications of the Lyon Die Handling Truck are as follows: capacity, 8,000 lb.; platform, 24 in. wide x 60 in. long x 30 in. high; wheelbase, 60 in.; overall length, 72 in.; wheel tread, 31 in.; overall width, 34 in. Trucks of other specifications but of similar design can be furnished with either a stationary table as shown or with a hydraulic elevating table. The elevating mechanism of the hydraulic table provides the means for bringing the table or platform at heights most suitable for different applications of die handling.

Trico Unbreakable Thermal Bottle Oiler

A visible, unbreakable, thermal bottle oiler is now being marketed by the Trico Fuse Mfg. Co., 2948 N. 5th St.,

Milwaukee, Wis. The oiler autom cally lubricates solid, wick, or we packed bearings. On the slightest is perature rise, the oiler discharges a drops of oil. As soon as a bearing

ceives the oil, it and the feeding of oiler stops autom cally. This opera is said to be repe constantly and p tively without att tion.

You're s A unique feature the Trico Bottle 0 schedule is the adjustable for SURE YO By means of a sin turn of the them TABLE E dome, a port hole opened or close more th thereby regulating must N flow of oil. The supply is always vis ble and one filling

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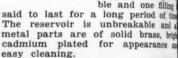
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The Trico Unbreakable Termal Botti Oiler is made in 1, 2, and 4-oz. capaci



Trico Unbreakable Thermal Bottle Oiler



SPEED PRODUCTI Get to your tools and supplies quickly

Production demands are greater than ever. Each link in the production chain must be smooth and fast down to the tool or stock room. Sluggish circulation here can form a bottleneck to production.

Make your tools easily accessible with Rotabin. Your tool or stock room will work smoothly and profitably with Rotabin and thus help step up production. Write today. No obligation.

THE FRICK-GALLAGHER MFG. CO., Wellston, Ohio

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November, 1940

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feature foure stepping up production could be shedules ... adding men ... BE table fa sim sure you ADD ENOUGH PORe them TABLE ELECTRIC TOOLS. Now rt hole close more than ever, skilled hands The must NOT be burdened with work a machine can do . . . must NOT be slowed down for want and a of adequate power assistance.

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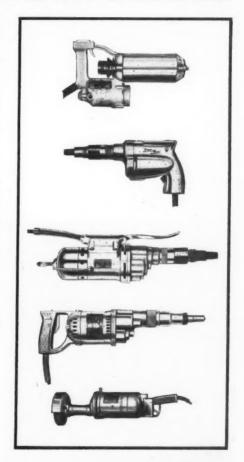
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Your Millers Falls distributor al Botti capaci can help you select the RIGHT bols for your needs from the broad Millers Falls line. Here's a wide range of kinds and capacities, with stands and accessories bill every requirement. Each is made to Millers Falls high standards of quality-up-to-theminute in fatigue-beating, costcutting, time-saving features.

> LET US ARRANGE A FREE TRIAL ON YOUR OWN WORK. No Obligation.



MILLERS FALLS COMPANY

GREENFIELD MASSACHUSETTS



ties and, according to the manufacturer, can be installed in an extremely short time without special tools. A wide range of adapters is said to make 95 per cent of installations possible without drilling or tapping.

Allis-Chalmers "Electrifugal" Pump

Allis-Chalmers Mfg. Co., Milwaukee, Wis., announces the "Electrifugal" pump especially designed as a complete pump and motor unit on one shaft and one housing. Instead of using a standard motor having special end housings and shaft extensions, the Electrifugal pump unit has a special motor with a one-piece cast iron motor yoke and pump bracket. The feet are cast integral with the housing and bracket and extend under the entire unit instead of under the motor only.

The special motor design, with copper bearing steel cover, meets NEMA specifications for splash proof motors. Totally enclosed, fan cooled motors and explosion proof motors are also available in the Electrifugal type.

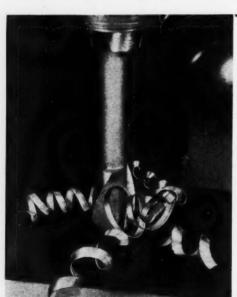
In splash proof construction, the

Electrifugal pump is now available sizes from 1 to 10 h.p. inclusive at r.p.m. and from ¾ to 7½ h.p. inclusive.



Allis-Chalmers "Electrifugal" Pum

at 1,750 r.p.m. for heads up to 10 h For normal service, the pump is but with cast iron casing, bronze fitted, i can, however, be made of all imbronze, stainless steel, or of other secial metals to suit any industry. In the chemical industry the sheet metal metal cover can be made of stainless at to provide the longest possible complete unit life on any particular installation.



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"TU-LIP" COUNTERBORES

A fitting companion to the famous Weldon End Mill. A trial of this tool will convince you it is the fastest, cleanest cutting counterbore on the market.

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A"JACK OF ALL TRADES"

... for grinding, buffing, polishing, sanding down castings and other operations. Ideal for production or maintenance.

Streamlined in design, Straight line ventilation which prevents clogging and assures cool motor operation. High powered and light in weight.

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Indispensable because of its flexibility and adaptability ... ball bearing...air-conditioned ... permanently lubricated. UNIVERSAL MOTOR.

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THE UNITED STATES



ELECTRICAL TOOL CO.

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November, 1940

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WHEELOCK, LOVEJOY & CO., INC.

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Buffalo "RPMster" Drill

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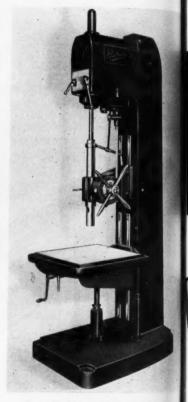
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Tap V D. G: Threa

A drilling machine incorporating a tures such as instant speed change, riable-speed V-belt drive, six-spine loy steel spindle, positive drive all-gas semi-automatic feed, and alloy a back gears, to be known as the land



Buffalo "RPMster" Drill

"RPMster" Drill, has been introdumed by the Buffalo Forge Co., 388 Broadwy Buffalo, N. Y. The machine is built two sizes; namely, a No. 3 with a pacity of 1½ in. in cast iron and a Nawith a rated capacity of 1 in. But machines have a 13-in. overhang as are designed to drill to the center of 26-in. circle.

The RPMster can be furnished to without back gears and with without power feed. Ample space und the spindle nose (27 in.) is provide

MODERN MACHINE SHOP

November, 19

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This workman is using a 5/16-24 "G. T. D. Green-field" Ground Thread Tap, a "G. T. D. Greenfield". Tap Wrench and a "G.T. D. Greenfield"? Plug Thread Gage.

" Drill porating

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six-spline

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Here's a Tough Job!



This is chrome molybdenum steel, No. 46S23, tensile strength, 180,000 lbs. It's an elbow assembly for aeroplane landing gears. Production is only 60 holes per tap, and precision ground thread taps have to be sharpened after every 10 holes. Former production was only 35 holes per tap with 6 holes between grinds. "Greenfield" taps excel on tough assignments and will turn in equally superior performances on easier jobs. Don't you want to arrange a test?

GREENFIELD TAP & DIE CORPORATION Greenfield, Massachusetts

Detroit Plant: 2102 West Fort St.

Warehouses in New York, Chicago, Los Angeles and San Francisco. In Canada: Greenfield Tap & Die Corp. of Canada, Ltd., Galt, Ont.

FOR ACCURACY: "G.T.D. Greenfield" Precision Ground Taps and Precision Thread Gages.



TAPS . DIES . GAGES . TWIST PRILLS . REAMERS . SCREW PLATES . PIPE TOOLS

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Raising blocks can be provided to further increase this space if desired. The heavy table is adequately ribbed and has a working surface of 23 x 22 in. surrounded by an oil and chip channel. It is attached to the column on an accurately hand-scraped dovetail slide. Although the overall height of the machine is approximately 100 in., all controls are located within easy reach of the operator. Available in pedestal models only, the machine can be furnished in multiples of one to six.

The Buffalo RPMster Drill is provided with 100 speeds which are instantly

changeable with the motor runner According to the manufacturer, is speeds are suitable for all types of my within the capacity of the machine a will cover speeds for drilling, tappu spot-facing, counterboring, hollow ming, and so on. Motor, starter, spechange mechanism, coolant system, electrical wiring of the machine a completely enclosed. Net weight of Machine, 1,875 lb.; net weight of Machine, 1,950 pounds.

Landmaco No. 1½ R Shell Tapper

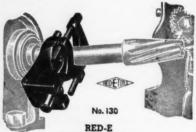
The Landis Machine Co., Waynesbon Pa., now has available a machine de signed especially for tapping the non end of shells ranging in size from To 155 mm. inclusive. Designated as a Landmaco No. 1½ R Shell Tapper, the machine is said to possess all of the distinctive mechanical features of the Threading Machine ph Landmaco many features which are said to assu accurate tapping operations on an m usually high production basis. The illu tration shows the machine arranged for a 75 mm. shell, although the specia arrangement which is available permit all size shells from 75 to 155 mm. to be handled on one machine and with one attachment.

The special carriage or holding device with which the Landmaco Shell Tapper is equipped comprises a work-supporting cradle, a hardened and ground busing which supports the nose end of the work, and a female center which supports the base end of the work. The female center is in alignment with the center of rotation of the machine spedie. The movement of the center is

ACCURATE SPACING..

... assured on all indexed work on a Universal Milling Machine. Straight, spiral or tapered.

No binding, cramping or lost motion.



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KNURLED HEAD SOCKET CAP SCREWS prevent finger-slip, speed up assembly, dress up your product!

MECHANICS prefer them because the knurled heads gear right to the fingers and prevent annoying finger-slip. Production men prefer "Unbrako" Socket Cap Screws because they speed up assembly; turn faster and farther before applying wrench or pliers. And designers prefer them because of the finer finished appearance they give to any product.

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And at the same time, don't forget "Unbrako" Self-Locking Socket Set Screws with the KNURLED POINTS. Once set up with no more than ordinary pressure, they automatically lock into place with a grip vibration cannot loosen. Saves maintenance costs... prevents costly trouble. Yet "Unbrako" Self-Lockers are easily applied, as easily removed and they can be used over and over again!



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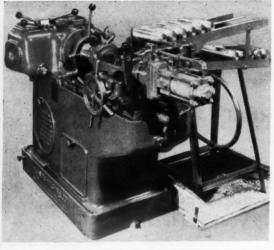
JENKINTOWN, PENNA. BOX 556

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actuated by an air cylinder mounted at the rear of the carriage, and is controlled by a lever conveniently located for the operator. In operation, the center is employed to push the work forward until the work sets firmly in the

maco Shell Tapper is equipped with collapsible tap designed especially shell tapping work. The tap is made a steel and all parts are either harden or heat treated and precision ground

The design of the tap provides for ternal ducts through what the cutting coolant is on veved directly to the cut ting edges of the chasers assure effective cooling at tion during the tapping of eration. A special feats of the collapsible tap is th tripping collar which als functions as a pilot to a sure the maintenance close tolerano unusually specifications for alignment of the thread with the body of the work. The collar ground so as to have a running fit within a pilot bush ing which is located at the front of the machine car riage adjacent to the bush ing supporting the nose the work. The pilot bush ing operates in anti-friction bearings to minimize wear.



Landmaco No. 11/2 R Shell Tapper

ground bushing supporting the nose end. This effects a locking action which holds the work rigidly in alignment for the

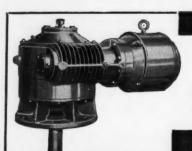
tapping operation. The female center and air cylinder of the machine are adjustable for shells of various lengths. In effecting set-up changes for handling shells of different sizes, the bushing which supports the

nose end, the work-supporting cradle, and the female center are merely interchanged for those of the correct size. The machine spindle of the Land-

In operation, the collapsing action of the tap is at tuated by the tripping col-

lar striking the end of the work. Thu, any danger of the chasers striking the shoulder at the bottom of the work to cause breakage is said to be eliminated In addition, threads are said to be held within very close tolerances for overall length.

According to the manufacturer, the Landmaco No. 11/2 R Shell Tapper provides a highly efficient and unusually exact means for shell tapping when maximum production is a prime factor. Production is estimated to average 91



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MASTUR Precision BORING HEAD

No gib, perfect adjustment, direct reading in thousandths. Vernier reading in two-tenths of a thousandth. Every working part adjustable for wear.

3 SIZES

No. 5—Boring Capacity 7", \$37.50 No. 6—Boring Capacity 11", 65.00

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Grooving, Recessing, Back Facing. Pilot is ball bearing. Will not gauld or tear hole. Operation almost instantaneous. Made in three sizes.



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Adjustment actuated by a worm. Made in three sizes.

TYPE HE 1/2 H.P.



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Also Grinder Spindles to fit your machine.

Internal or External.
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115 shells per hour, based on an operating efficiency of 100 per cent.

Kennametal Grade K4

A straight tungsten carbide grade of Kennametal which is said to have exceptional hardness has been placed of the market by McKenna Metals Co. 300 Lloyd Ave., Latrobe, Pa. Known as



Machining a Pomona Jet Pump Discharge Head with Kennametal K4 Tools

Kennametal Grade K4, this carbide tool material has a hardness of 92.0 Rockwell A and strength of 223,000 lb. per sq. in (transverse rupture test). The increased hardness and strength of Kennametal K4 is a result of the improved methods of carbide manufacture developed by the company for the production of the steel-cutting grades of Kennametal.

Kennametal K4 has the same thermiconductivity as other tungsten carbidated tool materials, namely, 0.19. Due to its high thermal conducity, together with its unusually high wear resistance. Grade K4 is said to be particularly applicable to the machining of hard, crumbly materials such as cast iron, "transite" pump, Bakelite, porcelain, hard rubber, glass, casein—as well as silicon aluminum, hard bronze, and other nonferrous materials.

The increased strength of Kennametal

MODERN MACHINE SHOP

November, 1940

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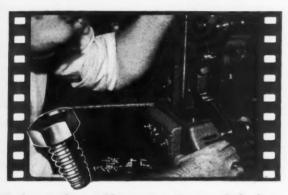
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Parker-Kalon Self-tapping Screws help keep Univex production moving at a steady pace

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1 Free Samples	of Self-tapping

Please send us Free Samples of Self-tapping Screws.

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November, 1940

MODERN MACHINE SHOP

211

Grade K4 is particularly desirable when taking rough cuts or interrupted cuts on hard metals. The illustration shows a tool tipped with Kennametal K4 on the stationary post of a turret lathe, set in position for a rough cut across the face of a Po-

mona jet pump discharge head. The cut is interrupted across the six holes on the face, but the Kennametal tool is said to have taken these "jump" cuts without being damaged in any way.

Brown & Sharpe Flexible Steel Rule No. 306C

A flexible steel rule designated as the No. 306C has been added to the line of rules manufactured by the Brown & Sharpe Mfg. Co., Providence, R. I. The rule is made in 6-in. lengths only. One side is graduated in 32nds on one edge and 16ths on the other, and the oppo-

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Front Side

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Brown & Sharpe Flexible Steel Rule No. 306C

site side has 64th graduations on edge only. The rule can be turn quickly from one graduation to to other without turning end for end. In E REPLOOM; H 32nds are numbered every fourth grade tion and the 64ths every eighth gradu The No. 306C rule is approx mately 1/2 in. wide and 1/64 in. thick

OUR DI Oman Self-Lubricating Metal TRS.

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November

Oman Self-Lubricating Metal is 100 being manufactured and distributed b Company, Philadelphia, P. Kitson Oman Metal is not an alloy, but is a roperly fined as a solidified emulsion of leading tools copper. It is self-lubricating and is an OOL LI



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Especially designed for salt, cyanide at Especially designed for salt, cyands at lead hardening, it's a time and meat saver. Complete with lid, derick for Bing lid, 8"x10" steel pot and loase blower. Excellent for tool, die, medetal pattern makers, in melting brass, and inum and nickel-silver. Fine for configuration of the same said in the same said in the same said in the same said to be s

Available with steel pots in 10"x12" or 14"x20".

If larger pot is needed, specify in quotations.

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> OWER TOOL COSTS, MORE ACCURATE ORK, REDUCED SCRAP, STEP-UP IN PRO-ICTION, MORE WORK from each producon machine.

stall Modern Oliver Tool Grinding Equipent and eliminate those BOTTLE NECKS in Jobs our plant.

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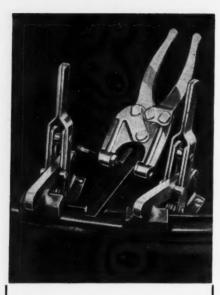
Cut illustrates the new 510 Oliver automatic twist drill pointer—for drills ¼ to 3"—Variable point angles—Variable clearances.

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November, 1940

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to be especially adaptable for inaccable bearings where lubrication is a cult or impractical.

No. 11-30 Metal Saw Sharper for Atkins "Curled Chip" Sa

To meet the need for an autom precision grinder to sharpen the "Cat Chip" Saw which was originated





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Diagram Illustrating the Crushing, Telming Action of the Conventional Saw Telming Action of the "Curled Chip Blade

cently by E. C. Atkins & Compan, 4 S. Illinois St., Indianapolis, Ind., Ath has collaborated with the Covel-In chett Company in the development the No. 11-30 metal saw sharpener. To preserve the scientific set of the



Battery of Covel-Hanchett No. 11-30 Precision Sharpeners Designed Expressly for Grining "Curled Chip" Saw Blades

Atkins "Curled Chip" tooth forms, the new sharpener is controlled by a special cam action for the exact clearances of high and low teeth as well as precise beveling. The importance of precise grinding can readily be appreciated, by cause upon exact maintenance of the

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ed, be of the tooth form depends the rolling or coiling action by which the chips are coiled into a specially curved gullet and spring clear of the end of the cut when tension is released. The tendency to grind the chips into fine pieces is eliminated and choking of the gullet by irregular filings is prevented.

Laminated Marked Shim Stock

Thin shim stock supplied in slotted cartons by Laminated Shim Co., Inc., Glenbrook, Conn., is now being fur-

nished plainly marked in inches on edge from 0 to 100 in., with half subdivisions throughout the 100. length. In this manner, the precision metal can be conveniently put



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You can choose from a complete stock of both A. S. A. and Acme Standards.

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through the carton slot and cut off in the exact size required. Not only in waste said to be eliminated, but the markings also act as a telltale signal indicating when a roll is about to be come exhausted.

The handy packaged rolls of brass of steel shim stock (6 in. wide and subable in 0.001 to 0.015 thicknesses) and said to facilitate shim stock storage prevent the stock from being mislaid and save time in use. Cut fingers are said to be avoided, and handling is make easier by the slot-dispensing feature.

The slotted carton can be attached the wall over the assembly bench or side a bench drawn for convenience.

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Install this superior clutch on those hard or troublesome drives, and end clutch problems for good. Performs best because it is designed, and built best. Releases instantly at high or low speed, and can quickly be adjusted for liner wear.

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New standards in precision tapping at high speeds, tremendously increased tap life plus other revolutionary features are now made possible with the new Procunier Universal Tapping Machines-with the new Procunier Tru-Grip Tap Holder. These features include: 1. Four speeds, ranging from 390 to 2050 R.P.M., efficiently handle jobs for which conventional high speed tapping machines are inadequate. 2. One machine handles tap sizes from No. 2 to $^{1}/_{2}$ " through two interchangeable heads. 3. Extra Long Spiral Compensating Springs conveniently located, with wide range hand-screw adjustments, maintain pre-set tap feeding and reversing pressures IN-DEPENDENT OF OPERATOR.

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The new Procunier Universal Tapping Machine is so designed that it actually allows the tap to establish its own lead. There is nothing more accurate than the tap itself in thread-cutting-so maximum tapping efficiency is attained where the tap is free to establish its own lead in cutting the thread.

This means more accurate tapping with every thread uniform, greater production with less spoiled work and less tap breakage. Send coupon for illustrated bulletins giving full details and prices, on Procunier Universal Tapping Machines, High Speed Tapping Head, and Tru-Grip Tap Holder.

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PROCUNIER SAFETY CHUCK COMPANY 12 S. Clinton St., Chicago, Ill.

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MODERN MACHINE SHOP 217

Oster "Rapiduction" Lathe

A machine having a capacity of 11/2 in. (round) for cutting-off, boring, tapping, reaming, facing, threading, and many other operations, to be known as

Oster "Rapiduction" Lathe

the Oster "Rapiduction" Lathe, has been announced by The Oster Manufacturing Co., 2061 E. 61st St., Cleveland, Ohio. Designed primarily as a low cost, manufacturing lathe for simple turning operations, the machine, it is claimed, does not require highly skilled labor for efficient operation. Equipped with a cross slide and saddle, it is quickly and easily set up for three operations. The spindle head is totally enclosed,

carrying the spindle and the worm a which runs in oil. The spindle run ball bearings and is built with an Am can Standard flanged type nose, h driven by a hardened and ground worm and bronze worm gear.

worm shaft is also mounted ball bearings.

Multiple V-belts from motor to the worm shaft privide the means for driving speed changes being made through quick-change sheare giving spindle speeds of tra 140 to 1,000 r.p.m. A cook pump mounted in the base driven by a V-belt from the motor. Mounted on the car riage with key and T bolts the tool post is provided with longitudinal adjustment for the length of the carriage.

A variety of chucking equipment including an automatic and universal face plate cu be obtained and either a manual or automatic stock stor can be provided. Power is furnished by a 2 h.p. 1,800/3,60 r.p.m, two-speed induction motor, with reverse or electric braking.

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The Oster Rapiduction Lath has a swing of 13 in. over bel and 6 in. over cross slide. The floor space required is

33 x 70 in. without bar feed extension.
When the bar feed is used, it extends 94 in. beyond the pan. The net weight of the machine is 1,386 pounds.

Scherr GS Machinists' Tools

The George Scherr Company, Inc. 130 Lafayette St., New York, N. Y., atnounces that it has placed on the mar-

for more than 1001 odd jobs



The Hjorth Bench Lathe has the speed, accuracy, handling east, and dependability that appeals to every operator. That's why you'll find the better shops equipping with the Hjorth Laths.

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Forty years of specialized manufacture are behind this line of heavy duty lathes. Made in a full range of

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sizes—from 14" to 36"—each of outstanding power, accuracy, range and economy.

THE BOYE & EMMES MACHINE TOOL

THE REID POWER-FEED SURFACE INCORPORATES SEVERAL EXCLUSIVE FEATURES,

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EST. 1900

Beverly Massachusetts

Export Department: 44 Whitehall St., New York City



November, 1940

MODERN MACHINE SHOP

219

ket its own line of GS Machinists' Tools. The line consists of machinists' combination sets with drop forged hardened square heads, hardened center head. hardened blade and reversible protractor head; machinists' combination set with hardened blade and center head, protractor and square head of cast iron, 4, 6 and 8-in. dividers; 4, 6 and 8-in. inside and outside spring calipers; hardened and tempered center gages; thickness gages; depth gages; surface gages, and magnifiers. Hook, sliding caliper, flexible and narrow tempered rules are also included in the line. The tools are

fully guaranteed for accuracy and in cision workmanship.

"Viking" No. V777 Pistol Gri Hand Drill

The Forsberg Mfg. Co., 125 Seaver Ave., Bridgeport, Conn., is now man facturing the "Viking" No. V777 Pis Grip Hand Drill shown in the illus tion herewith. The pistol grip hand of the drill is made of "Tenite" and designed for firm and comfortable gri ping. The handle is provided with magazine for holding drill points a

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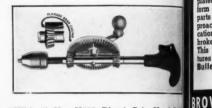
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"Viking" No. V777 Pistol Grip Hand Dal

has a hole on the end for hanging the drill in the work shop or tool rack.

In addition to the unique handle & sign, another feature of the No. Vindrill is the flanged gear casing which covers the pinion at the point where it meshes with the gear. The flange process of clothing from becoming a meshed between the pinion and the second control of the process of clothing from becoming the second control of the pinion and the pinion gear. The die cast pinions and ger are "factory tested" for accuracy and ease of operation. The tool steel chuck which is cadmium plated and polished has three tight-gripping, tool steel jawa hardened and ground, and with a the

PORTABLE TOOL STAND



Take tools, vise and bench to the work; not the work to the bench. Strong enough to carry and load. Easily moved anywhere and keeps tools and work together.

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The Western Tool & Mfg. Co. Springfield, Ohio



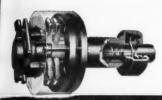
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SAVE OVER 80% ON SHARPENING HACK, BAND, CIRCULAR SAWS

The WARDWELL SAV-A-SAW automatically sharpens saw with teeth as fine as 32 to the inch at a speed up to 15 minute. Savings on 2 gross of blades will pay for the mechine. Assures keener cutting saws at extremely low cost. Write for complete information

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November, 1940



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MULE - PULL CLUTCHES

The merited reputation for exceptionally high power capacity which these clutches enjoy, is derived from the single-arm, anti-friction roller toggles used to impose pressure upon the friction plates. (See cut). This is the simplest form of toggle known, having the least parts and developing a leverage approach in the control of the control of the control of the control of the cut of parts and developing a leverage ap-proaching infinity. It requires no lubri-cation, has long life and cannot be broken by too tight an engagement. This is but one of the meritorious fea-tures of MULE-PULL Clutches; send for Bulletin 25 describing other mechanical advantages.

ENGINEERING CO.

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Gear Specialties



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Engineering Company Frankenmuth, Mich. pacity of ¼ in. The crank handle is finished in natural color with a clear lacquer covering. Overall length of the Viking No. V777 Hand Drill is 11½ in.

"Thor" Pix-Up Finder and Adjusto-Tray

To facilitate the handling of screws on assembly operations, Independent Pneumatic Tool Co., 604 W. Jackson Blvd., Chicago, Ill., has developed the "Thor" Pix-Up Finder and Adjusto-

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Productimeter counters record accurately machine output . . . running time . . . idle time, and operating costs. They count strokes, revolutions, lineal units, bottles, cans, packages, etc., either mechanically or electrically, with no chance of error . . . there is a model for each industrial need.

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"Thor" Pix-Up Finder and Adjusto-Tm

Tray, which sorts, picks up, and his screws for driving. It is said to elimate the time-wasting hand operation of picking up screws by the fingers at starting or holding the screw in tapped or drilled hole. Not magnetic but entirely mechanical, the unit is a tremely simple in design and operation.

The unit consists of the Adjusto-Inja novel arrangement of a screw-holize tray, which is spring-mounted on base and adjustable by clamp some at each of four corners for the particular length of screw to be driven. In



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Dress and true them regularly. Use Vincent Improved Huntington dressers equipped with Vincent high-carbon tool steel
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Insist on the dresser with the aluminum finish.

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1954 Riverside Drive CINCINNATI, OHIO

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Inside and outside cuts on dies. shoes, templets and endless other jobs can be done in a small fraction of the time required

by former methods. Saws, files and polishes. A highly developed, large capacity machine.

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SAVE TIME-MONEY
FAST GRINDER ON EVERY TOOLMAKER'S BENCH

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Kipp Air Tools give you the highest speeds, lowest prices, and are proving indispensable in tool room and production departments. Grinders sell from \$9.75 to \$58.75, Chippers and Filers at \$19.75. The BB Grinder illustrated is only \$25. Try one of these handy, fast tools in your own tool room. The FREE trial offer permits any concern with a satisfactory credit rating to try out any Kipp Air Tool for ten days. New catalog gives details.

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tray is of sheet steel with flanged sides and ends and has a series of longitudinal slots. Into this tray a quantity of screws is spilled; shaking the tray a few times suspends the screws in the slots by their heads.

A power screw driver equipped with the Pix-Up Finder is then placed over a screw head, pressed, and, as the tray depresses slightly, the finder grips the screw head firmly in perfect alignment, holding it ready for the driving opera-The Pix-Up Finder itself is an extension type that can be fitted to any Thor power screw driver. It has three slots lengthwise which open slightly as the finder is pressed over the screw head and close on the head to hold the screw, acting as mechanical fingers. Inside the lower end, the finder is recessed to fit the particular size and type of screw to be driven.

Over the finder is screwed a sleeve, the inside diameter of which is only slightly larger than the outside diameter of the lower end of the finder proper. With this arrangement, it is impossible, as the screw is picked up, for the finder to spread any further than necessary for entrance of the screw head into its recess. To compensate for the gradual

loss of spring action and for wear of the recess, the Pix-Up Finder is pivided with external spiral grooves with accommodate a spring tension ring. The ring permits a long range of gradu adjustments of the finder tension,

All Thor portable power screw drive pneumatic as well as Universal and Re Frequency electric, can be equipped the finder for driving all types and sin

of screws.

The Thor Pix-Up Finder and Adjust Tray are especially recommended to use in those industries where asse bling work involves the driving of gre numbers of screws-in the assembly such products as clocks, time contra mechanisms, refrigerators, radios, ha ing and air conditioning units, autom accessories, a and aircraft cameras.

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Cramer Model D2 Interval Timer

The Cramer Model D2 Interval Time shown herewith, product of The R. W Cramer Co., Inc., Centerbrook, Com is designed primarily for the control of

MAXI-JR.-E. **Super Sensitive Drilling Machine** For small holes .004" to .250" diameter. Self-contained drilling unit swings radially on column and locks to any position. All controls manually op-erated. 8" vertical adjustment of drilling unit with elevating screw. Horizontal work capacity to center, 91/2". Vertical work capacity, 10". Spindle speeds, 750 to 12000 r.p.m. Write for catalog.

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for TUBE SLOTTING & TUBE SHAPING

Special Tube Cut-ting Nibbler. Fast and accurate tube slotting, trimming and shaping by guide template, to a scribed line or free hand.

In addition to tube cutting, this spe-cial nibbler will cut flat sheets. Standard equipment includes a circle cutting attachment.

Capacity—Tubes 4" OD, to 36" OD. Wall Thickness

to 1/8".



Tube Cutting Nibbles.

Manufactured by W. J. SAVAGE COMPANY

TENNESSEE KNOXVILLE Since 1885 Pioneer Manufacturers of Nibbling Machina

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EFENSE HINE HAPING



Precision lathes for doing most accurate turning, drilling, milling, threading, filing, polishing, in the tool room or in production.

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WALTHAM, MASS.

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18 Gauge capacity
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Lowering or raising wheel head automatically starts or stops the table and magnetizes or demagnetizes 12" magnetic chuck. Other features include wheel head locking device and adjustment of upper portion of column for grinding saws, cutters, etc., having hubs up to 6" diameter. Six table speeds are available and a foot brake facilitates quick stopping of table.

O. S. WALKER COMPANY, INC.



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MODERN MACHINE SHOP

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LOW COST DRILLING with HAMMOND

The Hammond 4-ft. 6 speed Geared Head Radial for low cost drilling and tapping operations on holes up to 1" diameter. Spindle speeds 95, 190, 380, 570, 760 and 1140 R.P.M.



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Waltham Thread Miller

Let us explain why this machine is largely used for special taps, single and multiple worms, etc., in tool rooms and factories.

WALTHAM MACHINE WORKS WALTHAM, MASS. industrial equipment which can be use tomatically timed. The timer can be applied to various types of mixers, tunbling barrels, heat treating furnaces, as laundry machines, as well as to many other pieces of industrial equipment of which timers may be subjected to excessive moisture and dust condition. The Model D2 interval timer is

The Model D2 interval timer is driven by means of a self-starting sychronous motor and is enclosed in



Cramer Model D2 Interval Timer

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especially built, dust-tight and splashproof cast aluminum housing arranged for conduit connection and provided with a full vision and external setting knob. Front view bull's eye light signals can be supplied on order. The Cramer Model D2 Interval Times

The Cramer Model D2 Interval Timer available in 12 different scales ranging from one revolution in 15 seconds to one revolution in 24 hours. Three inch diameter dials with large, while etched characters against a black eameled background provide good vision and facilitate accurate setting. The non-clouding type of window which is made of unbreakable material, is recessed and gasketed to provide a dust-tight and splash-proof enclosure.

A slight inward pressure on the sturdily constructed knob assembly engages a clutch for setting the timer. When released, a spring and gasket prevent entrance of moisture around the control shaft. The black crackle finish can aluminum housing is provided with two ½-in. threaded conduit openings. The

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Outstanding in every detail for heavy blanking and forming work. All stresses are taken centrally.

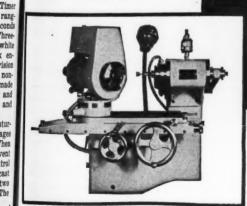
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Zeh & Hahnemann Co. 184 Vanderpool St. Newark, N. J.

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Bench Type INTERNAL GRINDER

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An accurate grinder suitable for set-ups that require quick changes for straight, tapered and beveled holes or for singlepurpose production. Diamond dresser automatically controls selected hole size

By changing spindles, this model grinds all sizes of holes from 3/16" to 3".

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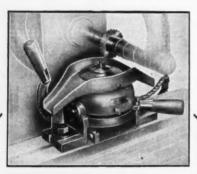
November, 1940

MODERN MACHINE SHOP

cover is screw fastened, made of %-in. black Bakelite, and is sealed by means of a rubber gasket.

Barrett-Cravens Half-Ton Lift Truck

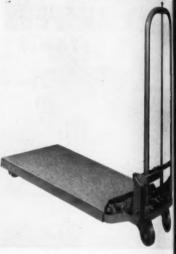
A ball bearing lift truck capable of handling loads up to 1,000 lb. is announced by The Barrett-Cravens Company, 3250 W. 30th St., Chicago, Ill. A sheet metal deck on the upper frame makes it possible to use the truck with



DEARBORN Automatic Chucking and Indexing Fixture MILLS OVER 1000 PARTS PER HOUR

Work held by draw in collets. Collets open and close automatically. Work automatically ejected. Indexes without loss of time for milling 1, 2, 3, 4, 6, 8, 12 or 24 sided pieces. Minimum set-up time required. Speeds up production. Positive and accurate in operation.

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Barrett-Cravens Half-Ton Lift Truck

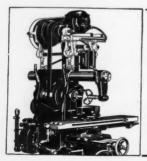
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or without skids.

The Barrett-Cravens Half-Ton Lift Truck is made in platform heights of 3½, 6, 7, and 9 in. Skids, if their us is preferred, can be made for use with the truck from undressed 2 x 4's. The skids are available in one width of I in. and have a full 2-in. lift.

"Controlled Abrasives"

A development which is said to be revolutionizing step in the manufactur of steel shot and grit, to be known "'Controlled Abrasives," has been unounced by the National Metal Abrasive Co., Cleveland, Ohio. By means of



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Give your men and machines every opportunity to produce at full capacity. Convert line shaft driven machine tools into direct drives. Remco Motor Drives provide the right speed for every job. Low installation cost Remco's exclusive adjustable motor base takes any motor of reasonable size — new, or USED. Write! Remco Products Corp., State and Hay Sts., York, P.

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 Especially adapted for slow speed and heavy thrust duty, such as marine rudder posts and similar installations.
 To order only — any quantity.

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Spot welding will save time and costs—no holes to pierce, no rivets to handle, no preparation. One operation only is required for spot welding metal sheet and wire products—improving appearance and strength since spot welding takes nothing away and adds nothing.

Modern production tools—ACE Welders—are paying for themselves in hundreds of plants,—General Electric,

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Peer - engineered Welders provide the latest features for fast production and uniform high quality welds at lower costs.

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Pier Equipment Mfg. Co.

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WELDERS

this process, standard shot and grit is so controlled that each size is given the correct processing in order to produce the best degree of toughness and hardness in relation to its size.

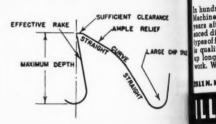
It is claimed that with the degrees of hardness and toughness controlled, entirely different results are obtainable. In fact, the shot and grit give the most advantageous results, just the same as it is possible to obtain steel for the respective uses to which it is to be placed. The control of hardness and toughness combined with the size is said to per-

mit the customer to place his abusticleaning, hardening or finishing of economical basis in keeping with the other operations.

Barber-Colman Paraform Milling Cutters

The line of milling cutters which been developed by Barber-Colman (22) pany, 207 Loomis St., Rockford, II., henceforth to be known as the "Par form" line, to identify the tooth form the Barber-Colman cutter from the used in other milling cutters.

In the Paraform cutter, as shown the drawing, the back of the too



Drawing Illustrating Design of Barber-Colman "Paraform" Cutter Tooth

consists of two flat surfaces blended by a smooth, curved surface. The role back of the land is straight in order make possible a minimum width had as the cutter is sharpened, and at the same time to maintain maximum strength at this important part of the cutter tooth. The flat surface on the back at the base of the tooth, combined with the curving blend between the two flats, makes possible a combination of maximum chip space and maximum



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The Walton Co.

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Barber-Colman "Paraform" Milling Cutters

strength in the tooth. The rake on the face of the tooth is planned for best cutting qualities, and the curve at the root of the pipe space is of such a radius as to prevent jamming of the chips between the teeth, permitting them to curl and flow out freely. Sharpening the cutter does not alter the form of the teeth; as the cutter is sharpened, the form is maintained throughout its entire life.

"Economy"
Line of Stan
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Tools

Manufactured a mass product basis, a new lof cemented obide-tipped shard cutting has been in duced by Carba Company, hall 11143 E. 8-W. The feature of

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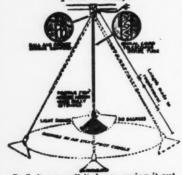
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new line consists in the mass product economies, which permit the merch dising of these tools at a price so that it will be found unnecessary to any great amount of brazing and gring in the customers' own plants.

In addition to covering, in five sta ard styles and three grades, the u majority of all turning, boring and ing applications in industry, the m standard tools are also capable of m

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Put; best for machine shop and
drafting room to avoid glare or
head strain. (Fastened above
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Push it up, pull it down, swing it out, swing it around, it stays put. WRITE FOR LITERATURE

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New WTTCo Diamond Impregnated WHEEL DRESSER

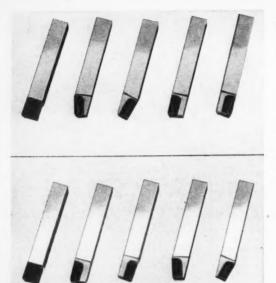
Whole, natural diamonds of high quality and extreme toughness are spaced regularly throughout the matrix to give great accuracy, uniform dressings and to bold wheel to size. These stones are anchored permanently in their matrix by strong chemical bonds that will not break under heat. pressure or rough abuse. No remounting! Lowered costs! After tool is put in machine it will give best results if left in original position. It is not necessary to turn or alter the area in contact with the grinding wheel

Send for literature and prices.

WHEEL TRUEING TOOL CO., INC. 3200 W. Davison

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ple conversion, by the purchaser, into hundreds of forms of special tools.

DESPATCH ALL AROUND
UTILITY FURNACES FOR TEMPERING
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Fig. 1—The New Carboloy Sm and Tool Line. Above: Steel Cam Tools with Copper-Colored Shapl Left to Right, Styles Nos. 1, 1, 7, and 4. Below: Tools for Catlin with Aluminum-Colored Shank. Id to Right, Styles Nos. 1, 7, 4, 14 and 13.

The illustration Fig. 1 show two complete sets of tools—co for cast iron and one for size —in one of the seven sizes i which these standard tools ar available. The shanks of the tools are colored to indicate whether the tools are for machining of steel or for cast iron. Those for steel are copper-colored and those for cast iron are finished in aluminate color; thus the user will be able to select the proper tool immediately.

No. 4 Motor

Milling Machine

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Introduction of a standard line of Carboloy tools for muchining steel has been facilitated by the development of a

general-purpose Carboloy grade for stell cutting. Tools of this grade (788) will stand more abuse than those of the management of the mana

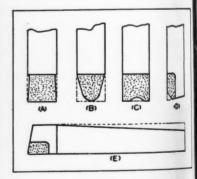


Fig. 2—Drawing Showing How Hundreds of Special Tool Forms May Be Produced by Simple Grinding Operations on Carboloy Standard Tools

sistance to abrasion than the 78A grade. They are designed to take cuts up to 1/2 in. deep with feeds up to 0.030 inch.

Special tools may be produced from

Steel Cutin Ored Shad Jos. 1, 14, 1

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from 1940 No. 4 Motor

Driven

Machine



Mounted on Cabinet Column

Surke motor driven milling machines Nos. 1. 2, 3, and 4 are specially suited for handling mall, difficult work on a production basis. Write for complete information,

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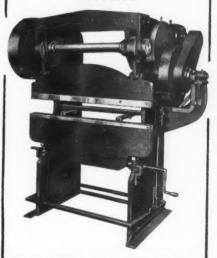


Automatic lubrication—forced feed. Multiple disc clutch and brake. Quick feed changes. Direct reading feed and stroke dials. Power rapid traverse to cross feeds.

THE SMITH & MILLS CO. CINCINNATI OHIO

CHICAGO eel press

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Does 40% to 60% of the forming work turned out by the average shop.

Here's a profitable, economical brake ideally adapted for rapidly forming metal sections such as in stoves, refrigerators, soda fountains, steel cabinets, metal furniture, steel boxes, and a great variety of sheet metal specialties. Its variable speed drive operates from 17 to 50 strokes per minute. The No. 253 CHICAGO STEEL PRESS is accurate, compact, and ruggedly constructed of highest quality materials.

Sizes 4, 5 and 6 ft. capacities up to 10 gauge.

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DREIS & KRUMP MFG. Company 7418 LOOMIS BLVD. CHICAGO ILLINOIS the standard tools through simple grinding operations. In Fig. 2 the dotted lines indicate the original shapes of the tools. Tools A and B are grooving tools and tool C is a forming tool—all three of which are derived from Style No. 1. D shows how a Style No. 7 tool can be converted into a chamfering tool and at E a facing tool is shown which has been produced from tool Style No. 4 by grinding back the shank. Well over two hundred forms of tools formerly purchased as special may be produced from this last-mentioned style alone.

All styles and sizes are finish ground,

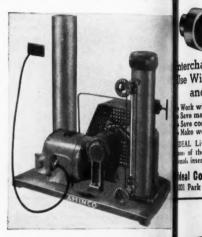




The Canadian Desmond-Stephan Mfg. Co.,Ltd. Hamilton, Ontario, Canada ready for use, and are stocked for mediate delivery.

"American" Hydraulic Book Pump

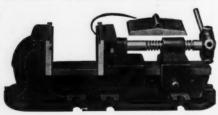
A motor-driven hydraulic pump of ble of developing pressures up to ilb. per sq. in. is announced by the an



American Hydraulic Booster Pump

ican Instrument Co., Silver Spring II The pump is especially applicable use in creating high test pressure it catalytic hydrogenation work, for demining the bursting strengths of cliders, spheres, and so on, for opening high pressure and hydraulic intensities and for determining the effects of by pressures and their sudden release a various materials.

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Work with heavier loads at higher speeds! Save man-hours on centering work! Save cost of fast wearing dead Centers! Make work easy-increase production!

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PRESSED STEEL

> JERHINTOWN, PENNA. BOX 556

ISTON - BETROIT - INDIANAPOLIS - CHICAGO - ST. LOUIS - SAN FRANCISCO Fig. 732. Drawer is extra.

Pat'd. and

er, 194 November, 1940

MODERN MACHINE SHOP

237

The American Hydraulic Booster Pump consists essentially of a gearedhead motor (for operation on 115 or 230 volts a.c. or d.c.), reservoir, and com-pression chamber mounted on a substantial cast iron base. Theoretical dis-placement per hour of the pump is 553 cu. in. Working volume of the reservoir is 1,300 ml.; actual volume is 3,000 ml. The compression chamber has a working and actual volume of 1,300 ml. and is tested to 9,000 lb. per sq. inch.

Diamond 8 MM. Roller Chain

The diamond No. 88 Roller Chain illustrated here, which is said to weigh almost exactly half as much (1% oz. per ft.) as the smallest power transmission chain previously produced in the United States, has been developed by Diamond Chain & Mfg. Co., Indianapolis, Ind., for dependable performance in services for which other roller chains are too heavy or bulky.

In spite of its minute dimensions — 0.315 in. (8 mm.) pitch, rollers of 0.197in. diameter by 0.125-in. width, and 1,100 lb. average ultimate strength - No. 88 Roller Chain is made to the same standards as larger Diamond chains, % to



Diamond 8 MM. Roller Chain

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21/2 in. pitch inclusive. It is claim that material specifications are equi rigorous, case hardening and heat tree ing is as exact, and dimensional macision is identical. The 192 individual parts in each foot of chain are asset bled to a total length tolerance of on at Equip plus 0.0156, minus 0.000 inch.

The chain is said to be equally pa tical for dependable power transmis at extremely high speeds and for applications for which maximum compact ness without sacrifice of enduring acc racy is essential-for positive driving light weight machinery, for timin



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THOR STAMPS are made of special, tough alloy steed-correctly hardened to withstand any punishment you can give them. They give clear, uniform marks—for a

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An Inexpensive ABRASIVE GRINDER. is claim

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> Write for illustrated folder on this and other styles and sizes.

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Combination Demagnetizer and Electric Etching Pencil. Marks symbols in hardest steel. Demagnetizes instantly. One of our models popular in tool rooms for 15 years.

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Now more than ever before industrial plants of all kinds need a fast sure method of repairing and fabricating metal parts. A.C. welding is the answer and Marquette is the leader in this field. With a Mar-

quette one workman can do more welding and produce better welds thus increasing production without added man power. Costly shut downs are avoided by welding broken machine parts on the spot many times without removing or preheating the part. There is a Marquette model to fit your needs—eight models ranging from 125 amps. to 350 amps. and from \$38 to \$448.00. Ask your jobber or write today for complete information. complete information.



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mechanisms, for precision instruments and equipment, for facsimile models, and so on.

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S. G. Frantz Co., Inc., 161 Grand St., New York, N. Y., has brought out a filtering mechanism which magnetically removes ferrous particles from circulating oil and coolant systems of machines and engines. Known as the "Ferro-Filter," the filter removes iron and steel particles as fine as 1/25,000 in. from sus-

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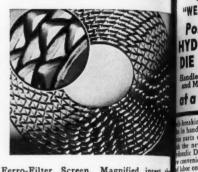
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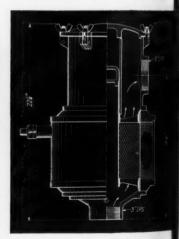
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Ferro-Filter Screen. Magnified insert sh collected particles on screen edges.

the use of a stack of powerfully m netized patented screens enclosed in casing through which the oil or cools flows, abrasive iron particles even microscopically fine as one micron



Drawing Showing Design of Model BP FerroFilter

extracted from the fluid. The remote of these fine metal particles assurprotection to bearings and eliminate costly breakdowns due to bearing in ure or wear. In addition to the many other substances including have been found in the material lected by the FerroFilter, probably

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NEW "WELD-BILT" **Portable** HYDRAULIC DIE LIFTER Handles Heavy Dies and Machine Parts

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threaking, man-killing handling heavy maparts or dies are easy the new "Weld-Bilt" pulic Die Lifter! Adds convenience, saves time distor on many of YOUR duction jobs—transportposition on production achinery - raising skid ine level — double-deck-gloaded skids—and many

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"Weld-Bilt" Hydraulic Lifting mechanism has finger tip control at handle. Mounted in shockproof position HORIZONTALLY bestandard sizes available

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Ways No Leveling Required A simple and excellent de-vice for balancing, straightening They are made in the following sizes:

Swing	Greatest Distance Between Standards	Capacity in lbs.
20 in.	20 in.	1,000
40 in.	30 in.	2,000
60 in.	30 in.	2,000
72 in.	66 in.	5,000
96 in.	88 in.	10,000



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We also offer a complete ine of Midget Milling Cutlers, ground by hand from he solid after hardening. They do a faster, cleaner job than rotary files, last longer and can be re-ground repeatedly. Unlimited forms, shapes, helix angles, etc., are readily obtainable. Write for full details.

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Severance Tool Manufacturing Co. 1516 East Genesee Ave. Saginaw, Mich.

November, 1940



CENTERLESS GRINDING ACCURACY—PROMPT SERVICE

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The FerroFilter is used to filter a lating lubricating oil in internal a bustion engines with reduction gen large as 25,000 h.p., turbines, and a machinery. The FerroFilter is able in three types; gravity, under and pipe line. Gravity feed types and pipe line. Gravity feed types and pipe line to gravity feed types are fed from below the feed types are fed from below the a pipe either by pump or by gan head. The pipe line type filter a pressure-tight housing at the top up pipe connections to the housing at the bottom of the FerroFilter, either which may be used as the interthough bottom feed is generally pread to the state of the state

For the model shown direct cun at 110-120 volts is required. A post tube type rectifier can be supply which can be connected to any 00 can.c. lamp socket.

Yale & Towne Utility Service Truck

The illustration shows a Yale & Tor Utility Service Truck made by The I & Towne Mfg. Co., 4532 Tacony i Philadelphia, Pa., in operation at plant of a large western metals i supply company. The truck is power by giant electric batteries, is mound on a base equipped with rubberth wheels, and has a 78-in. wheels which allows an extremely short in ing radius. The boom has a reach 17 ft., can be swung in an arc of a proximately 300 deg., and has lift capacity of 6,000 lb. at a 7-ft. outred. In the plant in which this truck

used it has proved valuable in m



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Just a few of the many standard shapes which are carried in stock.

M. A. FORD MFG. CO.

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GRIPOMATIC

CAPACITIES-5 to 50 TONS

Patented grip prevents slipping, svolds damage, eases work in close quarters. Alloy steel — guaranteed.

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TUNGSTEN CARBIDE TIPPED SPECIAL TOOLS

MAKE YOUR PRE-SENT EQUIPMENT DOMOREAND BETTER WORK WITH SUPER CAR-**BIDE TIPPED** TOOLS.

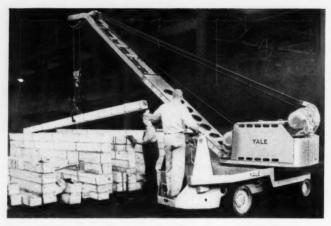
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Yale & Towns To Service Trus at Work

efficiency of unit is its m ity. In the yard stacking larger sizer pipe, transp pipe to the the ing machine loading ships on the trucks, service truck most useful of equipment

ways than one. Whereas by the old method of loading pipe and other stock into trucks there was a high percentage of accidents such as crushed hands, wrenched backs, and foot in-juries, the use of this truck has re-duced the accident precentage to the absolute minimum.

Undoubtedly the chief factor in the

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Two important applications of electric arc in aircraft structural w ing have been prompted by the un necessity for fast production in main defense. These new uses for are n ing include fabrication of engine most

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T. H. LEWTHWAITE MACHINE

PUNCHES CUTTERS BENDERS SPECIAL TOOLS

PUNCHES and DIES for round, square and other shaped holes. Catalog sent on request.

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Wide variety of pitches.



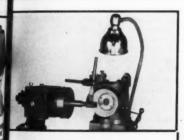
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ey install VIMCOLIGHTING on their ting and grinding machines where betw sight makes for faster, more accurate ok VIMCOLIGHT'S localized, high insity "light on the spot" is easily atthed to any machine. VIMCO has solved y lighting problems. Send us yours.

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DUTTON DIAMOND-GRIP Collets are expertly designed and accurately machined to suit the specifications of each make and size of screw machine. They all have Sutton diamond serrations that grip tighter under less tension. Only Sutton Collets are diamondserrated.

DIAMOND-Sutton GRIP Collets



TOOL 2895 W. Grand Blvd., Detroit, Mich. Accessories for Screw Machines and landing gear forks and other appli-

Both have been made possible by development of an electrode designed and manufactured by The Lincoln Electric Company, Cleveland, Ohio, expressly for plane welding. Known as "Planeweld," the electrode is of shielded arc type for welding SAE-4130 and X-4130 chrome molybdenum steels, which are widely used in airplane construction. "Planeweld" is suitable for welding in all positions and when used on steels of the types mentioned provides weld metal with physical properties similar to the

metal welded. Its welds are without undercutting. There is min spatter and good crater condition welds made by the electrode or steels respond to heat treatment a similarly to the parent metal.

Planeweld is available in two the Planeweld No. 1 for material off and heavier, and No. 2 for light a airplane parts (up to approximately 164 in.) and airplane tubing.

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The electrode, which was devento overcome difficulties formerly and tered in airplane welding, is away in four sizes: No. 1 in ½ and ½ and in and No. 2 in ¼ and ½ in. It is able for welding airplane fuselage, supports, torque tubes, bomb mount alloy chain links, antenna machairs, as well as engine mount landing gear forks, or any other plane part constructed of the mentioned.

STRAIGHT-CIRCULAR-IRREGULAR Cutting of Sheet Metal



BEVERLY cuts flat to any size or shape. Three sizes: No. 1, weighs 16½ lbs., cuts up to 14 gauge. No. 2, weighs 32 lbs., cuts up to 10 gauge. No. 3, weighs 55 lbs., cuts up to 15 gauge. Write for circulars and prices.

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Throatless Shear Co.
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DICKERMAN HITCH FEED



Adaptable to any ordinary punch press without press alterations. Feeds from any position on any style die. Quick set-up—economical for short runs.

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Process for Producing J & Electromatic Oil Tempered Spring Wire

Electromatic Oil Tempered Spir Wire for special mechanical spring now being produced by an electric rect resistance method by the Jose Laughlin Steel Corp., Pittsburgh, I The method or process for productny wire consists of passing sufficient at tric current through the wire so as heat it to the desired temperature, much the same manner as the coli an electric toaster are heated by thresistance to current. The electrical sistance set up in the wire increase temperature uniformly, and the cross section of the wire is heatel multaneously to the desired quenching temperature.

THE PURE OIL CO. CHICAGO, U. S. A.

PURE THREE POINT LUBRICATION A Complete Line of Industrial Patroleum

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A Pure 60 m near will b solve year is cution profet Write today.



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· Chicago Rawhide Ham mers and Mallets are the tools for striking hard accurate blows safely on any surface that must not be cracked, battered or marred. The tough Java Water Buffalo hide, coiled, compressed and treated for long life will not split, break or even dent, and has resilience to absorb rebound for easier, accu-



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THE ORIGINAL Etchograph

Mark tools, dies, gages and fixtures of any fer-rous metals including the hardest alloys and carbides-quickly-plainly.

Three sizes to meet all requirements. combined Etchograph and Demagnetizer.

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Today there is a way to step up the productive output of your machines, and make faster deliveries, without adding to overhead — specify CARBIDE TECO Cutting Tools NOW AT REDUCED COST.
Check these cost-cutting features you enjoy with TECO Carbide Cut-

ting Tools:-

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- Machines steel without previous annealing.
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TUNGSTEN ELECTRIC CORP., 562-39th ST., UNION CITY, N. J.



MODERN MACHINE SHOP

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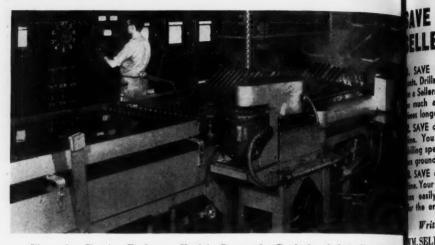


Illustration Showing Equipment Used in Process for Producing J & L Electromatic Oil Tempered Spring Wire

The equipment employed in the process handles a wide variety of gauges and is constructed so that wire fed from reels passes first through tension rollers and then through a molten electrical contact. From there, the wire passes through a second molten contact, completing the electric circuit through the wire. The contacts are held at a constant predetermined temperature, the second contact also serving as a primary quenching bath from which the wire immediately passes to an oil bath for the final quench. This doublephase quenching feature provides a gradual reduction in wire temperature, thus preventing the steel from being shocked by a sudden great drop in temperature. Continuing from the final-quench through a molten tempering

bath, the wire is reheated to give the desired physical properties and tigue values. It may then be pa through a light soluble oil bath prior shipment.

The increasing demand for highers more uniform physical properties spring wire is largely responsible for development of the process, its fur mental advantage being, the manufa turer states, the exactness by which factors affecting the ultimate quality the wire are readily controlled. constant flow of electric current of a trolled voltage and amperage fed i the wire, together with the closely n ulated speed of the machines, is said govern heating of the wire to with very exact limits. In addition, then couples in all contact, quench, and i



NICHOLSON EXPANDING MANDRELS — for holding any job with bores from $\frac{1}{2}$ " to 7" while being machined on lathes, grinders, or millers. Fourteen sizes-great time savers.

OTHER PRODUCTS: Steam Traps, Chromium Plated Steel and Stainless Steel Floats, Compressed Air Traps, Flexible Couplings, Steam and Air Separators, Arbor Presses.

CONTROL VALVES.

flat disc type for operating single and double acting air, steam, water or oil cylinders. 1/4" to 11/2" sizes.



Drills Seller s long SAVE C d spe SAVE Your easily the en Writ

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W. H. NICHOLSOI Wilkes-Barre, 136 Oregon St.

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AVE three ways with ELLERS Drill Grinders

SAVE on drill sts. Drills ground a Sellers last much as 20 mes longer.

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Your lubication problems, whether large of special nature, send or special nature, and or special nature, and or special nature, and or special nature, and or special nature.

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FOR THE JOB



(Fig. 203)

No one drive meets all your requirements advantageously. Be sure to choose the correct type drive to fit your need. We offer V Belt Drives, Gear Motor Drives, 4 speed Gear Box Drives. Send us a list of your requirements and get unbiased recommendations.

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per baths provide automatic temperature control over units. The resulting combination of accurate time and temperature regulation makes possible precise control of the heating and quench-

ing cycle.

As length of heating time and control of quenching temperatures have a direct effect on grain structure, this method, it is claimed, makes it possible to control and reproduce desired grain sizes with the utmost accuracy. The double-phase quenching provided has been found to considerably improve the physical characteristics of the wire,

and makes possible a close control tensile strength, elastic limit, elastic n, and Rockwell values. Also, a all the heat is within the wire is decarburization and scaling can be trolled to narrow limits.

Applications of the J & L Secondaria Maric Oil Tempered Spring Wire and be found in widely diversified industrian Brake springs, clutch springs, grids springs for automobiles, various applications in the airplane constitution industry and other industries among the uses for this type of win.



SAROSTON Lathe Grinder

A Sturdy Tool for Precision or Production Grinding.

Use wheels on either end of the spindle.
SIZES UP TO 2 H.P.

THE SAROSTON CO. 251 PARK ST. UPPER MONTCLAIR N. J.



Carboloy Announces Shape D Finishing Equipment

Development of a complete line equipment for finishing and servicing Carboloy drawing dies for product special shapes of bar and rod—such hexagonal, square, rectangular, he round, and so on, is announced by the boloy Coompany, 11143 E. 8-Mile H. Detroit, Mich. The new equipment being made available directly to use enabling them to employ such dies en nomically for short as well as long mand in numerous types of special products.

Coincident with the announcement Carboloy is offering shape dies in its rapid finishing to shape desired by a user, through use of the new equipment The line comprises standard hauge and square rough-cored dies in a wir range of sizes, covering all common requirements of industry. These is are so designed as to require a minum of stock removal for finishing the usual sizes, the cored shapes his virtually identical to the usual format a wing dies with a 16-deg. approximately identical to the desired and a 30-deg. back relief and angle and a 30-deg. back relief and





20" long x 12" wide x 6½" deep. 16 ga., drag holes and handles both esh

Lots of 100 & 200 less 3%; 300 up less 5%

J. L. LUCAS & SON, INC. 1 Fox Street Bridgeport, Con

Lots of 50 \$1.00 each e control Also, si wire its can be o QUICK DELIVERY on the RIGHT BUSHING FOR EACH JOB Write for a set of Colonial Specification sheets and prices COLONIAL BUSHINGS, INC ed by Ca

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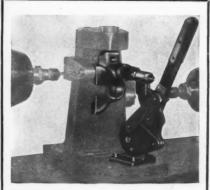
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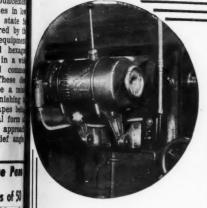
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SPEED UP your production equipment with the installation of Cam Action Toggle Clamps. Lock in any position, hold tight under vibration, low in cost.

16839 HAMILTON AVE. DETROIT, MICH.



A No. 2 B & S Milling Machine equipped with Schultes 4 Speed Drive.

NEW **ALL-HELICAL GEARED** 4 SPEED SCHULTES UNIT

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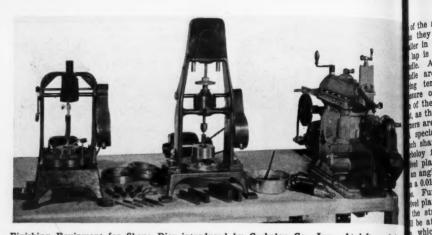
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Essentially the equipment consists of a die-bearing sizing machine, a die shaping machine, a hand polishing tool and an adaptation of a bench shaper for machining the required laps. Recom-

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mended for use with this equipment a laps of mild steel, to be used in a or bination with various grades of bor carbide or diamond powder as lappi compounds for roughing and finishing Fu

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All three of the simple machine a trice of same basic action. In all cases an else trice motor drive actuates an eccept which in turn imparts a reciprocate which in the vertical spindle.

which in turn impacts a mediae, mediae, motion to the vertical spindle.

To rough and finish the bearing of a dies, laps of the same shape as the bearing, but with 0.010 in. taper, a diese, the number of laps required withing the mediae of times to the number of times to the pending on the number of times (11 lose m in. of stock has to be removed to finish re mad the bearing of the die.

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of the same shape as the cross-secthey are to produce, but are ler in size. In lapping the angles, lap is reciprocated by the vertical de. At the same time, die and die are rotated slowly by hand. ing tension maintains a uniform sure of the lap against the porof the die at the rear machine, so as the die is rotated, all faces and mers are lapped in turn.

special adaptation of an Atlas ch shaper has been worked out by boloy for machining the laps. The el plate on the shaper is mounted mangle so that in the normal posia 0.010 in. taper is produced on the Furthermore, in shaping, the ivel plate is set over at a 5 deg. angle the stroke so that the feed marks be at an angle to the axis of the which-when combined with the of lapping compound—produces a ng action on the die.

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as lappe in 8-in. stroke shaper, designated as d finish e "Shape-Rite," especially designed relations for it old to be shaped and small manufacturing achines for it is now being marketed by Sales is have it evice & Mfg. Co., 3401 S. 45th St., es an ele impeapolis, Minn. The machine is of the eccepts of design and is intended to handle ciprocess with that is normally done on a large s of bor

n eccentified design and is intended to handle ciprocain with that is normally done on a larger achine, the advantage being in the ring of h curacy and greater speed.

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nce, w The ram is balanced with the rocker igles in mm to operate smoothly at high speeds and the ram bearings are so designed but the ram is always completely in in bearing at full stroke, even when fusted forward. Ram bearings are of mare-type design to ensure maximum ear. The toolhead on the ram is of by design, arranged so that it will wivel to 190 deg. and provided with lock at the top. The rocker arm is of pecial, massive construction and is heavily ribbed. It is pivoted at the ottom on a heavy bearing and linked the top of the ram. The design is much that the tendency is for the ram be pulled down into the cut, thus diminating tool chatter and aiding in balancing the ram at high speeds so

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A pre-mixed floor resurfacer made special gum-like material that is said cure to concrete-like hardness and provide wear surface throughout its tire thickness, to be known as "Rod Tred," has been placed on the man by the Rock-Tred Co., Inc., 629 Wai ington Blvd., Chicago, Ill. According the manufacturer, Rock-Tred can placed indoors or outdoors from % in thickness to a feather edge and bon permanently to concrete, metal, is wood flooring, or asphalt mastic floor It can be used in from 8 to 12 hou after it is installed and is said to harder under severe usage.

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down by anyone.

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Ivanhoe "Masterlite"

tion. It is available in either single or double length wiring channels for two or three 40-watt lamps.

> Both the Masterlite and the 50 Foot Candler incorporate the Miller construction features of easy installation, wiring simplicity, convenience of maintenance and cleaning.



Miller "50 Foot Candler"

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magnetic steel containing 11 to 131/2 per cent manganese and 31/2 per cent nickel, is now carried in stock for immediate

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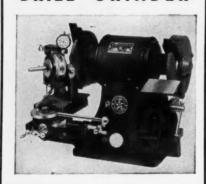
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der prop since there is said to be no low to the strength when Manganal is cooled by the welding temperature. This make 1 boxes, reasonable structural material of a consistion that otherwise is said to susher ha difficult to handle. Welding rod of 1 anganal stainless composition has been found at 120-ingive very satisfactory results by and 1-week with Manganal.

Manganal is said to have all the vantages of 11-14 per cent mangan steel in resistance to wear and surh Taccali work hardening. Thicknesses up to in. can be sheared. Manganal can flame cut and requires no subseque heat treatment when formed or pund A belt of aid to be f belting er, and hot. This characteristic is claimed give Manganal a distinct advanta over 11-14 per cent manganese a which must be given a full heating a quenching treatment after forming the original strength and ductility desired-a treatment which often a torts the formed shapes.

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Chemical composition and physic

properties of Manganal are: Carbon, 0.60 to 0.90. Manganese, 11 to 131/2 per cent. Silicon, 0.60 to 0.95.

Nickel, 2.50 to 3.50.

Tensile Strength, 140,000 to 150,000 l per sq. in. Elastic Limit, 55,000 to 60,000 lb.)

sq. in.

Elongation in 2 in., 721/2 per cent. Reduction of Area, 54 per cent. Hot rolled Manganal plates are a rently being used for electrical a cations where no-magnetic charac tics rather than abrasion resistances required. Welders are successfully a Manganal for patching broken worn-down parts made from 11-14 p cent manganese steel. It is also b used as a substitute for heavy can where weight reduction is important Manganal is strong and durable a

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der proper application will resist imno los stand abrasion for a long period of
cooled h. Typical applications include jourhis make i boxes, pedestal liners, wear plates,
al of a standard in the hammers, and so on. Hot rolled said to wher hammers, and so on. Hot folice said to wher hammers, and so on. Hot folice in rod of anganal steel is carried in stock in the folice of four 1 x 120-in. plates in 18, 14, 38, 1/2, 5%, sults we, and 1-in. thicknesses.

unaffected by moisture, oil, dust, heat, or cold. The material is said to assure long life for new belts and to rejuvenate old or neglected belts. According to the manufacturer, Taccalin conditions new belts rapidly, eliminates power waste, slippage, and frequent take ups, and permits belts to run slack. It is also said to be unharmful to the skin.

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subseque A belt conditioning material which is or punch claimed advanta the subseque of the subsequence of the subs ten durer, Taccalin is economical to use physical will not harden, cake, or glaze. With the aid of the material, belt suraces are said to remain cleaned and

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This book affords a basis for study of blue print reading which, together with practice in the actual reading of drawings, will guide the student to profi-ciency in this important subject. While the book has been compiled and published primarily for welders, it contains information of value for anyone concerned with mechanical construction.

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MODERN MACHINE SHOP

standing. Drawings made in clear, solid black lines and with extra-large letter-

ing assure easy legibility. Beginning with an introduction pointing out the importance of being able to read blue prints, the book takes up the following important subjects: simple welded object presented as a study; picture drawings of the subject; perspective drawing; isometric drawing; limitations of these and other types of picture drawings; showcase views of the subject; (orthographic projection); the three views necessary to give a complete showcase description; "line of

sight" projection of views; bringing to three views to the same plane as on; sheet of paper; further analysis of point and line projection; line "alphabet" and line projection; line "alphabet" and dimension lines, extension lines, breat lines, cutting plane lines; many examples of simple and more complex bits in the mission ples of simple and more complex bits in the mission ples of simple and more complex bits in the mission lines, breat lines; cattling plane lines; many examples of simple and more complex bits in the mission lines, breat lines; many examples of simple and more complex bits in the mission lines, breat lines; many examples in the mission lines, breat lines of transportation in size by a known ration explanatory views (auxiliary); return to a "showcase" viewpoint to solve the ribing at problem of presenting and interpreting slanting surfaces accurately; examples are made of necessary explanatory views and pless and ture drawings to help in studying them are more discretions, cutting a plece for clear presentation to the reader; broken view of interpretation; study of appearance, discussion and example; development lines but the basic weld symbol, the arrow dies dee method of indicating type of weld, almount and shape of weld, length of weld and other necessary information; analysis of complete weld symbol and its use, and so or original of the previous instruction drawing with welding symbols added; special symbol instruction drawings and discussion.

A comprehensive explanation gives the How to sight" projection of views; bringing the

A comprehensive explanation gives the How to student a clear understanding of with Fren ous symbols used in drawing of differ and is ent types of welded joints, including and Swe butt, corner fillet, lap, and so on. The truction illustrations contained in the book is in nearly clude practical examples of drawings of a number of machine parts, pipe connections, general construction, tanks on St... and so on. A list of questions and answers allows the student to test his knowledge.





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en view. The book has 128 pages and contains en view The book has 128 pages and contains ew threat just ations showing various types of ance, dis the setups and methods for handling pment of important machining operations. Bee a row ides dealing with all phases of lathe position sork the book also includes a generous weld, size mount of general shop information, weld and uch as reference tables and formulas, analysis ries, gauges, specifications, shop hints, its use and so on.

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elds with Originally introduced in 1907 in the example example om of a 16-page manual, the book has drawing en rewritten and improved each sucspecial reding year until now more than 1,500,and dis 80 copies have been printed. Besides he English version, the 35th edition of gives the How to Run a Lathe" is being printed of variant French, Spanish, and Portuguese, of different is also being prepared in Dutch neluding and Swedish. The book is standard inon. The truction in many school machine shops book in mearly every country. wings of

Copies are available by writing to the pe control touth Bend Lathe Works, 980 E. Mad-tanks on St., South Bend, Indiana.

> Installation and Maintenance of Electhe Motors. By E. Molloy. Published y Chemical Publishing Co., Inc., 148-D Lafayette St., New York, N. Y. 180 ages, 110 illustrations, 4 tables.

A practical treatise for installation ngineers, plant engineers, and electritians, this book is designed to acquaint actory men with the task of installing nd maintaining electric motors of all ypes, ranging from fractional horseower to several horsepower. Discussed turn are Installing Small Motors, The Installation and Erection of Meium and Large Sized Electric Motors, Wiring and Starting Electric Motors, Care and Maintenance of Electric Mo-



tors, Bearings and Lubrication, and Sliprings, Commutators, Brushes, and Brushgears. A feature of special in-terest is the large number of starter wiring diagrams included in the chapter on "Wiring and Starting Electric Motors."

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Airco Electrode Selector Chart. implify the selection of the proper elecrode for the job at hand, Air Reduction as announced the publication of an Electrode Selector Chart for use by arc relding operators. Under separate miles, listed according to the metal to e welded, the chart enumerates such

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"Diesel Engine Parts Precision Bon and Faced on Heald Bore-Mattes." 20-page catalog illustrating and describing the use of Heald Bore-Matics is rood l boring, facing and turning Diesel entipparts has been published by The Hel roup. Machine Co., Worcester, Mass. Dia parts borized include pistons, connect ing rods, cylinder heads, rocker am oil pump bodies, gears, blower par governor parts, fuel injector bodies, fu pump housings, and so on. Copy in upon request.

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lower part Themac High Speed Portable-Electric r bodies, is recision Grinders. In this 20-page, pro-l. Copy in suely illustrated catalog, publication of The McGonegal Mfg. Co., Jones Bldg., East Rutherford, N. J., the construcion features, uses, and specification of Themac High Speed Portable-Electobing is tric Precision Grinders, which are avail-Accessoria able in numerous types, are clearly pecial unit given. Copy free upon request.

> Carboloy Chip-Breaker Grinder Bulle-tin No. GT-121. Carboloy Co., Inc., 11143 E. 8-Mile Ave., Detroit, Mich., has released a technical bulletin designated as the No. GT-121 covering its chipbreaker grinder for use with cemented carbide tools designed for machining of steel. Complete operating instructions are given, including types of wheels to be used, coolants, methods of duplicating desired chip-breaker shape and size, and so on. Copy free upon request.



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"Meeting Milling Cutter Requirements." Detailed information on the Positive-Locked blade milling cutter, a development of Lovejoy Tool Company, Inc., Springfield, Vt., is presented in a catalog now being issued by this firm. Although having the advantages of an inserted tooth cutter, which means that the teeth can be adjusted or replaced when worn, the Positive-Locked blade milling cutter is said to have the characteristics of a solid steel mill. Complete details on the modern line of Lovejoy milling cutters are given in Catalog 25, copy of which will be sent free upon request to any mechanical execution

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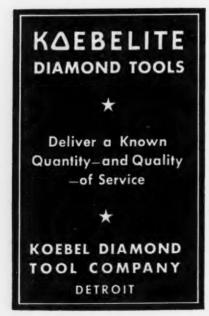
Loveioy Metal Cutting Tools of the positive lock inserted-cutter type are the subject of a 24-page catalog now bein published by the Lovejoy Tool Co., Inc., Springfield, Vt. Tools described and ilustrated include, turning, facing, and planing tools as well as boring or ining bars. Copy of Catalog No. 10 fre upon request.

Fray "All Angle" Milling Machine, Complete information regarding the Fray "All Angle" Milling Machine M 7 is given in an eight-page illustrate bulletin now being issued by the Fra Machine Tool Co., Glendale, Cal. Frag
"All Angle" Milling Attachments an also illustrated and described in the bulletin, copy of which can be obtained free upon request.

Kennametal Price List No. 5. A 18 page price list designated as the No. 1 containing prices on 20 standard Kennsmetal-tipped tools, five styles of Kennametal blanks, nine semi-standari tools, two milling cutters, and three lathe and grinder centers is now being issued by McKenna Metals Co., M Lloyd Ave., Latrobe, Pa. The price ist also contains prices for blank weights from 1 to 1,000 grams of Kennametal Drawings illustrating 20 standard Kenametal tools are shown on the front

Price List No. 5, which is printed on yellow paper for easy identification, sipersedes all previous price lists as of October 1, 1940, and is available free upon request.





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No. 10 fre (Brownswood Ave., Albion, Mich., antaining descriptive information and lustrations regarding some of the varimaterial handling equipment avail-Machine the company. The house or-an will be issued at regular intervals faching the dat can be obtained free upon request.

Cal. Fraj. Hill Open Side Hydraulic Surface hments at Grinders with built-in spindle motor are in the bulk the subject of a six-page illustrated built-in designated as the H-V-1 which is now being issued by The Hill Acme 0. 6600 Breakwater Ave., Cleveland. Ohio. General information, applications, the No.; the bulletin, copy of which can be so f Ken.

Fostoria Localites - localized lighting units - are the subject of a 24-page catalog released by The Fostoria Pressed Steel Corp., Fostoria, Ohio. Machine, bench, and table type Localites available in single arm, double arm, and special models are illustrated and described. Fostoria Fluorescent and Silver Bowl Canopy Model Localites are also covered in the catalog, and illustrations showing various applications of Localites are included. Copy of Catalog ML-25 free upon request.

Ideal Electric Markers and Electric Etchers are the subject of a four-page folder released by the Ideal Commutator Dresser Co., 1031 Park Ave., Syca-more, Ill. The Ideal Electric Marker can be used to mark glass, steel, iron, bronze, brass, hard rubber, bakelite, aluminum, alloys, wood, porcelain, and so on, while the Ideal Electric Etcher, available in "Standard," "Universal," and "Heavy Duty" types all of which are featured in the folder, is said to permanently engrave products made of iron, steel or their alloys, such as dies, gages, drills, gears, saws, shafting, and so on. Copy of folder free.



Gisholt Performance Data Sheets Nos. 46 to 49, publications of the Gisholt Machine Co., 1219 E. Washington Ave., Madison, Wis., include case studies of the latest production methods in metal turning operations using Gisholt Turret and Automatic Lathes. The data was obtained in such plants as manufacturers of automotive trucks, oilwell drilling equipment, and milk bottling machines. The actual tooling is clearly illustrated for each job and the operation sequence and machining time is given. Data sheets free upon request.

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NIELSEN TOOL & DIE COMPANY 1863 Gardner Ave. Berkley, Mich. "Six Ways to Step Up Production" in the title of a four-page illustrated folds issued by the Cone Automatic Machine Co., Inc., Windsor, Vt., describing the uses of features of 4-spindle, 6-spindle and 8-spindle Conomatics, Cone 4-Spindle Automatics, Vertical 4-Spindle Automatic Spindle Automatic Chucking Machines. Copy free upon request

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Madison-Kipp General Sales Bulletin No. 100. In this 32-page bulletin, publication of the Madison-Kipp Corp. 20 Waubesa St., Madison, Wis., the complete die casting service as well as the complete line of fresh oil lubricators and high speed air tools offered by this firm is profusely illustrated and described Included with the die casting service announcement is a special section entitled "The Kipp 'Data-Book' School" which contains practical information for those interested in die casting.

Copy of Bulletin No. 100 will be sent free of charge to anyone addressing a request on his company letterhead.

"Boston" Power Transmission Equipment Catalog No. 53. The 1940 edition of a catalog on "Boston" Power Transmission Equipment is now available from the Boston Gear Works, Inc., North Quincy, Mass. This catalog, designated as the No. 53, contains 288 pages of specifications and list prices on all "Boston" stock gears, chain and sprockets, ratio-motors, reductors, flexible couplings, universal joints, pillow blocks, pulleys, ball bearings, and so on It also includes essential calculations for figuring gear and speed reducer applications.

Copy of Catalog No. 53 free to any mechanical executive upon request.

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frice Unbreakable Wick Feed Oilers are the subject of a four-page illustrated and descriptive bulletin now being pubished by the Trico Fuse Mfg. Co., Milwaukee, Wis. Copy of Bulletin No. 27 free upon request.

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"Airplane Parts Precision Bored, Faced, and Turned on Heald Bore-Matter" is the title of a 20-page bullein now being published by The Heald Machine Co., Worcester, Mass., which il-Bulletin lustrates and describes the wide variety orp., 208 of airplane parts that can be precision he comfnished on Heald Bore-Matics. as the shown in process include pistons, bearings, master and articulating crankcase rear covers, oil sumps, intermediate crankcases, bearing housings, crankpin and crankshaft oil plugs, valve guides, piston pins, propeller blades, propeller blade bushings, hydraulie cylinders, and so on. Copy free upon request.

> Electro-Matic Self-Cleaning Air Filter Model "C." Bulletin No. 250-C covering the improved Model "C" Electro-Matic Air Filter, product of the American Air Filter Co., Inc., 696 Central Ave., Louisville, Ky., has been released by this irm. Consisting of 16 pages, the bullein describes and illustrates the construction and operation of the Model "C" filter in terms that can be understood by either the engineer or layman. Diagrams and cut-away sections show how electrical precipitation and automatic air filtration have been combined in a compact self-contained unit requiring no outside electrical connections other than an ordinary 110-volt a.c. lighting circuit. Copy of the bulletin free upon request.

Blanchard No. 18 Surface Grinder for use in grinding all sizes and shapes of pieces that have exterior flat surfaces, such as various pump parts, machine tool parts, tools, and dies, is profusely illustrated and described in a 24-page catalog now being published by The Blanchard Machine Co., 64 State Ave., Cambridge, Mass. The catalog covers thoroughly the operation and construction features of the No. 18 unit and illustrates and discusses its application to various workpieces. Copy free to any mechanical executive upon request.

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CATALOG LIBRARY

To obtain copies of the catalogs listed here, indicate on the coupon the number of the item in which you are interested and mail as directed.

1. Turret Lathe

Morey Machinery Co., Inc., 410 Broome St., New York, N. Y., has issued bulletin illustrating and describing the Morey No. 2 turret lathe.

2. Threading Machines

New booklet featuring Geometric precision threading machines has been released by The Geometric Tool Co., New Haven, Conn.

3. Precision Gages

Just off the press is the Sheffield Gage Book, detailing the design, construction and application of precision gages together with standards and constants useful in practical inspection work. Sheffield Gage Corporation, 1525 East Third St., Dayton, Ohio.

4. Milling Cutters

New catalog titled "Meeting Milling Cutter Requirements" (Catalog No. 25) presents details on Lovejoy milling cutters. Lovejoy Tool Co., Inc., Springfield, Vermont.

5. Hydraulic Surface Grinders

The Hill Acme Co., 6400 Breakwater Ave., Cleveland, Ohio, has issued Bulletin M which contains detailed information on Hill hydraulic precision surface grinders.

6. Hydraulic Cylinders

Hydraulic Cylinder Catalog No. 229 is available from Hanna Engineering Works. 1765 Elston Ave., Chicago, Illinois.

7. Carbide Tools

"Firthite General Purpose Tools" is the title of new bulletin and price list available from Firth-Sterling Steel Co., McKeesport, Pa. 8. Gear Charting and Measuring Machines

Description and illustrations of the new Illinois Electrical Recording System and what it offers in inspection operation is offered in folder available from Illinois Tool Works. 2511 N. Keeler Ave., Chicago, Ill.

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9. Portable Electric Hammer

Bulletin illustrating and describing the Tornado portable electric hammer has been issued by Independent Pneumatic Tool Co., 604 W. Jackson Blvd., Chicago, Illinois.

- 10. Munitions Threading Equipment
 New booklet issued by Landis Machine Co., Inc., Waynesboro, Pa.
 presents Landis equipment for
 threading shell noses, fuze pluss
 bomb parts, adapters, lifting plus
- and so forth.

 11. Chip-breaker Grinder

Carboloy Co., Inc., Detroit, Mich, has released technical bulletin No. GT-121 covering new chip-breaker grinder for use with cemented carbide tools designed for machining of steel.

12. Arc Welders

Of interest to all engaged in an welding operations is the new & page Lincoln Weldirectory. Available from The Lincoln Electric Co. Cleveland, Ohio.

13. Hydraulic Lift Truck

Bulletin No. 139, issued by West Bend Equipment Corp., West Bend Wis., illustrates and describes the new 'Weld - Bilt' Hydraulic Lift Truck.

14. Metal Cutting Bandsaw

New bulletin issued by Kalamazoo T & S Co., 507 Harrison St., Kalamazoo, Mich., illustrates and describes the Kalamazoo metal cutting bandsaw.

5. Drill Presses

New drill press booklet details Boice-Crane drill presses. Boice-Crane Co., 1729 Norwood Ave., Toledo, Ohio.

6. Hand Millers

Machinery Mfg. Co., 3636 Irving St., Vernon, Los Angeles, Cal., has issued folder illustration and describing the Vernon No. 0 hand miller.

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"The Fellows Method," a new book released by The Fellows Gear Shaper Co., 78 River St., Springfield, Vt., presents much valuable information on gear shaping methods.

18. Collets and Feed Fingers

Sutton screw machine collets and feed fingers are completely detailed in catalog available from Sutton Tool Co., 2895 W. Grand Blvd., Detroit, Michigan.

19. Contour Machining Handbook

New handbook on contour machining presenting 158 pages of valuable metalworking helps may be obtained from Continental Machines, Inc., 1306 S. Washington Ave., Minneapolis, Minnesota.

20. Steel Users' Data Sheets

Data sheets for users of alloy steels are available from Wheelock, Lovejoy & Co., Inc., 130 Sidney St., Cambridge, Massachusetts.

21. End Mills

The Weldon Tool Co., 3000 Woodhill Rd., Cleveland, Ohio, has issued new catalog No. 8 detailing the Weldon line of end mills.

22. Bearings

New catalog just issued by Ahlberg Bearing Co., 3029 W. 47th St., Chicago, Ill., contains much usable data on the proper selection and maintenance of anti-friction bearings.

23. Magnetic Chucks

Walker Magnetic Chucks and standard rotary chucks are illustrated and described in Circular W4. O. S. Walker Co., Inc., Worcester, Mass.

24. Speed Reducers

Catalog 438 gives complete description and specifications of Farrel speed reducing and speed increasing units. Farrel-Birmingham Co., Inc., 381 Vulcan St., Buffalo, N. Y.

25. Radiation Pyrometer

Bulletin No. 100 illustrates and describes the Pyro radiation pyrometer. The Pyrometer Instrument Co., 101 Lafayette St., New York, N. Y.

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Pler Spot Welder Data. Condensed has on Ace Spot Welders, product of he Pier Equipment Mfg. Co., Benton larbor, Mich., is included in a fourage folder prepared for distribution by Information on manuallyperated and automatic Ace Spot Weldes is segregated with a brief description concerning the applications of the urious sizes made, which range up to kva. Copy of folder free upon request.

Hygrade Miralume Catalog. A 22-page listing the various model fluorescent lighting units available in the Miralume line and giving a complete story of these units is now being distributed by the Hygrade Sylvania Corp., Miralume Division, Ipswich, Mass. Copy free to anyone addressing a request on his company letterhead.

Tomkins-Johnson Rivitor. An eightpage bulletin illustrating and describing in detail the features, uses, and operation of the Rivitor, a machine for automatically feeding and setting solid rivets, is now being issued by The Tomkins-Johnson Co., 620 N. Mechanic St., Jackson, Mich. Complete specifications are listed. Copy free upon request.



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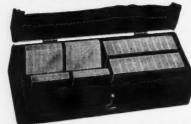
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